# AMATEUR TELEVISION QUARTERLY

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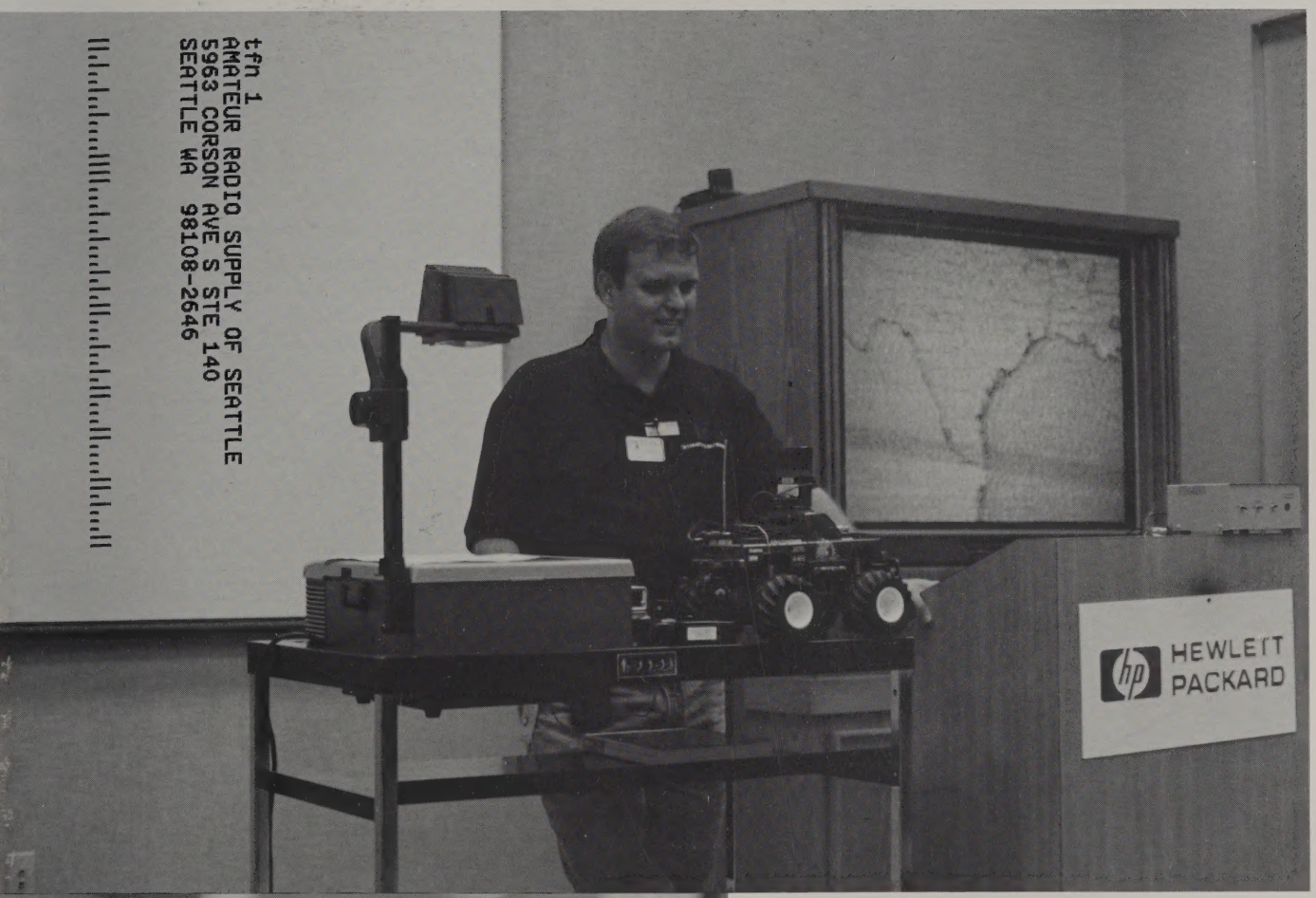


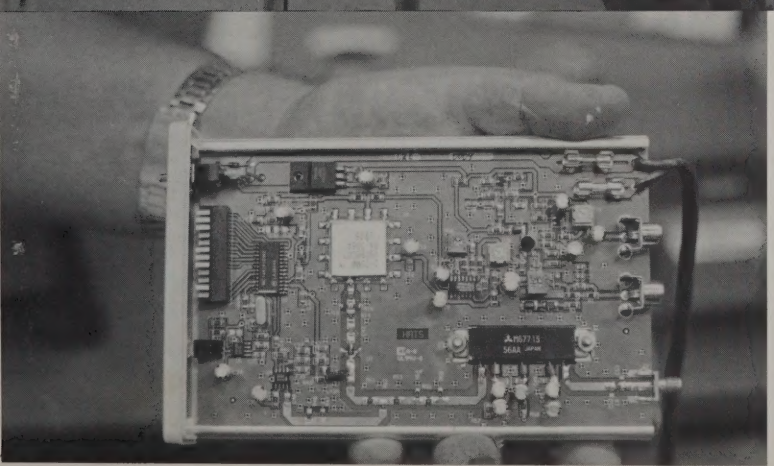

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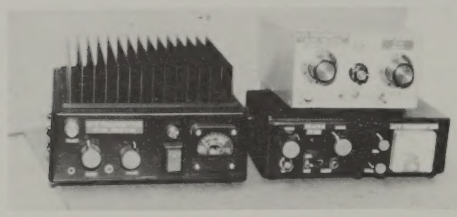

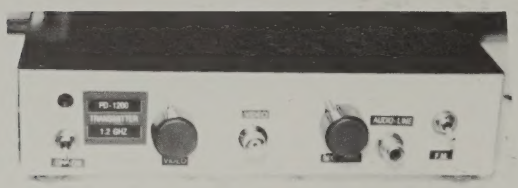

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## VOLUME 9 #4 FALL 1996

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Translations: Andrew Emmerson G8PTH

## *COVER PHOTO*

*An all day ATV seminar in Houston featured club President Bill Potter N5MBM (pictured, story starting pg 30) explaining ATV R/C, Fred Juch N5JXO explainng a simple portable ATV repeater, Bob W8ZSX explaining hot to home brew cheap filters, Ed Manuel N5EM, with cheap ATV antenna kits for ATV, Rick Pense, WD5BQN, on using satellite gear for cheap 3.3 GHz video links, and more. The highlight was the availability of the club's 23 CM 3 watt FM video transmitter, (pictured) that you can assemble in less than an hour! Photos by KB9FO*

Authors guide: Send in something legible. If you can do it in typewritten (computer print out) form in a laser text great, dot matrix is OK too. You can send it by E-mail to ATVQ on America OnLine, or via the US Snail to ATVQ 3 N Court St., Crown Point, IN 46307. If you send a computer disk, have it formated to an IBM (dos) machine, not Mac. If possible use WordPerfect, any version, or something that will convert. Diagrams should be clear, on plain paper (not lined) not Xerox copies. Photos can be color or black and white. If you have spell check, use it. Since this is a one person philanthrophic effort we do not pay for material. If you want a free subscription in exchange or if I can find any Test Pattern mugs you can have one of those. ATVQ accepts all material at the authors risk. Indicate if you want any of it back. ATVQ also accepts and may publish any mail it receives via its electronic mailboxes. We publish the authors information as it is on the E-mail header. We try to be as accurate as any other publication, but sometimes we are as bad as the others too. Most material is done in WP 5.2 and layout is in PageMaker. 5.0

Because my TV station work schedule starts at 7 am to 7-9 PM, and most weekends lose at least one day to remotes and other broadcast stuff at my real life job, the best way to "talk" to me is via E-mail or fax, lastly the answering machine. I get to it about once a week. You can also find me at home typically Sundays between 10 and 4 if I'm not working, or Saturday 9 to 3 if I am not working. That's how life is these days. 73 Henry KB9FO

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This issue was sent to the printer November 11th, 1996. The deadline for the next issue is January 15, 1997. Your feed back is important. Please take a moment and send in your thoughts. The IN box is empty again! Send in your articles and news for the next (winter) issue. See you at Dayton!

# WHO IS CAPTAIN VIDEO?

**by Tom Pusateri W9NBG**

The name of Captain Video is bated around the ATV hobby with no respect. Little do you youngens know of the hero of which you speak. What does Captain Video have to do with Amateur Television, why nothing. But he was one of the first, if not the first 15 min serial TV show on the air. He had his own TV repeater system linking all points of planet Earth with his two space ships, the X9 and the Galaxy, well how else could he have communicated with his Video Rangers in the field. His name fires in me black & white TV images hidden under piles of junk TV shows stored in my mind. Yes kids Captain Video was a real science fiction hero of early 1950 TV. His show was probably the second show I saw on TV, Don Winslow (who?) was the first. To prove to you that Captain Video was real, and not just some name your buddy made up, I have pictures to show you. See there he is the tall one with the Video Ranger at his side. The fellow who plays the Video Ranger is still in acting and appears on TV scopes during the day. Two actors played Captain Video. The first actor is on the comic book cover No. 5. I only remember the name of gentleman pictured on cover No. 6, his name was Al Hodge. Sad to say he passed away a few years ago not knowing that the name Captain Video was on the lips of a number ATVers.

[Ed. note: Captain Video was on the Dumont network, and was part of the first 5 day a week series on television. The original star was Richard Coogan later replaced by Al Hodge and they wielded an early Phaser called the zapgun, made from a tin can, a light socket, a cardboard tube and a


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# WHO IS CAPTAIN VIDEO?

lot of imagination (one of many such weapons). Stars we recognize today, Jack Klugman, Tony Randall and Ernest Borgnine got their first TV roles on this show. The same year Jackie Gleason and Rosemary DeCamp started the series, The Life of Riley, sans laugh track and a live audience later turning the roles over to William Bendix and Marjorie Reynolds which had added the canned laugh track and was filmed before a live audience. As Chester A. Riley would say..."What a revoltin' development this turned out to be!"]

*The opening of Captain Video tv show is shown in the CBS program, 60 years of Television.*

# VIDEO SOURCES FOR THE BEGINNER

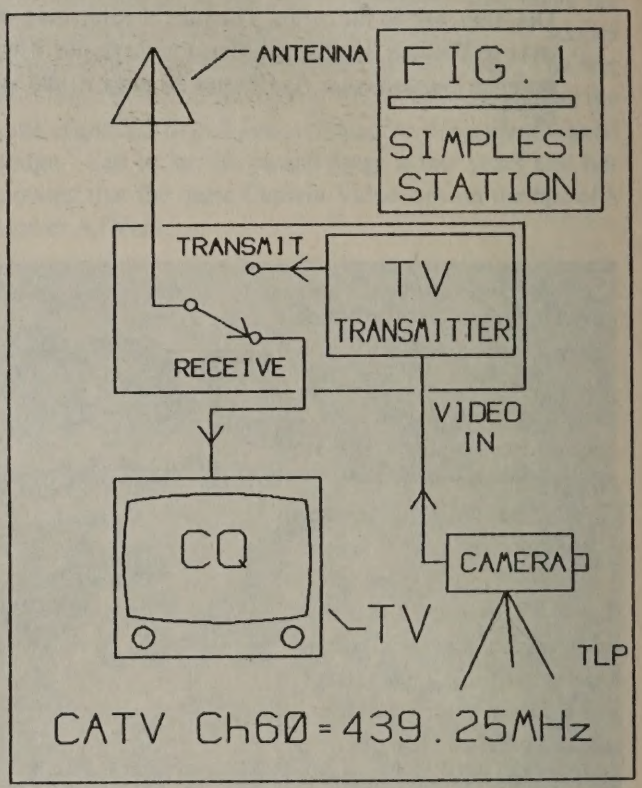
by Tom Pusateri W9NBG

For some beginners to Amateur Television (ATV), dealing with video sources and the setting up the most minimal station can border on the mysterious. Most hams get a chance to put up antennas, run feed lines, and hook up transceivers, so putting together the RF. end of an ATV station has a familiar ring to it. But this video stuff is something else. I would like to present a few ways to tie those video sources to the ATV transmitter, and soon you will see the mystery will disappear.

At this point I am going to cover some basics just so there are no loose ends later on. Lets start with the ATV transceiver. Most ATV transceivers are really a TV transmitter and a TV converter in one box. The converter is only part of the full receiver needed to see the picture, and hear the sound sent along with the picture information. A TV set is the other part needed. The converter takes the ham TV signal, on say 439.25 MHz, and converts it to channel 3 or 4 TV. It works some what like a VCR, channel 44 in the antenna connector, channel 3 output to the TV. That takes care of the first job of the transceiver, to see the other hams picture.

The transceiver's second job is to put out to the antenna your TV picture. If you have a properly working video (picture) source, like a TV camera, the camera is connected to the VIDEO IN jack on the transceiver, and you are all set to go. The antenna and power supply connections are the same as the usual audio-only rig. That's it! The video input jack is the only thing different from a regular ham radio.

The transmitted video information can be in the form of AM or FM. Sound can also be sent with the picture as FM, just like the commercial stations do, or on the 2 meter band. If you have spent any time trying to see local ham TV stations in your area, you have found that the 2 meter ham band is more likely to have the ham's sound part of the broadcast, rather than the sound being sent with the picture. This works out nicely because 2 meter FM operation is so common, and can be used for coordination, like nets. On 2 meters more than one person can comment on ones video at a time, and it can be used so that two hams can point their narrow hi-gain video antennas at each other. The 2 meter frequency



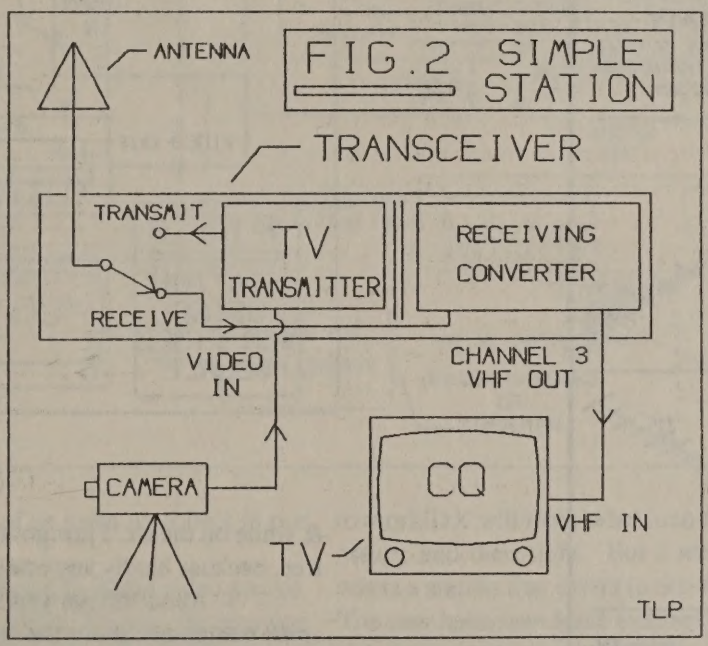

usually used in a good part of the country is 144.34 MHz. So now you see you can have one way to send video and two ways to send sound.

Some hams have separate ATV transmitters and receivers, instead of a transceiver which has both units in one box. The simplest station setup is shown in figure 1. The antenna is run through the transmitter's antenna changeover relay right to the TV set. You might ask your self, "Self, how did he do that, I thought you needed a converter.". That is true for the bands above 450 MHz, but TV sets that have cable TV capability and cover cable TV channel 60 can stand alone as a ham receiver. This is done by switching the TV set to cable TV channel 60 (CATV CHANNEL 60 = 439.25 MHz, and connecting the UHF receiving antenna to the VHF connector. Yes I said the VHF connector, believe me I tried the UHF connector and it doesn't work. A camera, computer, or stand alone ID. board is the video source and is fed to the transmitter. (CATV CHANNELS 57, 58, 59 & 60 are all in the 420 MHz ham band.)

# VIDEO SOURCES

Figure 2. shows the next simplest station setup, and that is to use a converter as mentioned above. Stand alone converters are available for the 450 MHz, 902 MHz, and 1250 MHz higher bands. For consistency I will show the transmitter and receiving converter in one box, with a double line separating them.

Now lets get back to dealing with the video sources. We must now look at the types of video sources available to us. What is needed is a video source to show your call sign and other items on the air. Back in 1959, when I got bitten by the ATV bug, we had to build our own sources. Oh sorry, this sounds like the start of an old war story. To day we have video sources available that we never imagine of back then.




The most common video source to day, I think, is the VCR. Here is how to put your VCR to work as a ham's video source. If you don't have a camcorder to make a tape, find a friend, or make a friend fast of someone that has one. Make a tape with the following. Print in big, neat, bold black letters, your call sign and QTH on white cardboard. You can do a nice job with the letters you get from a hardware or art store. Record about 10 to 15 min.. of the call sign (at the fastest tape speed), it will be useful for testing and black letters on a white background can be seen best on the air at a distance. Then try recording pictures of your antenna, you in your ham shack etc. Some hams have some interesting things on tape to show. Some imagination would go a long way here. I plan to record picture of my collection of old ham receivers and model street car lay out. Figure 3 shows an ATV station using a VCR. With this arraignment the output of the transceiver's converter is sent though the VCR to the TV set, that way what is seen on the ham band can be recorded. Also the tape you play and is transmitted to an other ham, can be monitored by you while it is on the air. To me, this arraignment makes lots of sense for the beginner, and is the bases for my station.

The TV camera is what first comes to mind when one thinks of a video source for the ham station, but it is not as common in today's world as the VCR. It will do the obvious, let you look into it and say "Hello world!". A QSL card can be held in front of it for an ID.. The camera plugged in to a VCR can give you lots of versatility. TV cameras can usually be found at hamfests. Some hams get along with out them.

There is a very nice stand alone board that can be programed to produce your call sign, color test patterns, and some graphics. It is a convenient way to always have a picture to put on the air at your finger tips.

Computers can be used as a video source, there are three ways to do this.

1. Converters are made that will take the signal going to a computer monitor, and convert that signal to normal TV video. You can show on the air color drawings from graphics programs, photographs that have been scanned in with a scanner, or other pictures that you are able to capture on your computer. Remember that what you see on a VGA screen is not what you get on a normal TV screen. The resolution of VGA is far better that normal TV, so watch how much detail you put into your graphics.

2. Before VGA there was EGA, and before that CGA. CGA uses the same scan rates as normal TV. Running from the computer to the monitor is a cable that contains red, green and blue information. The green signal has the synchronizing pulses needed to lock in the picture, that means that the green channel can stand alone as a video source. When a graphic picture is run to the ham TV transmitter, it is sent as a black and white picture. So what you see on the computer monitor as green will appear as black

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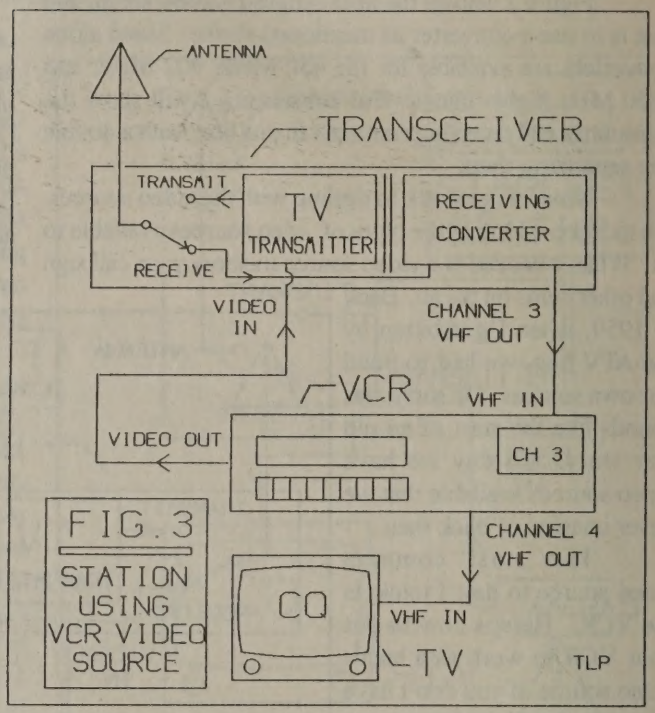
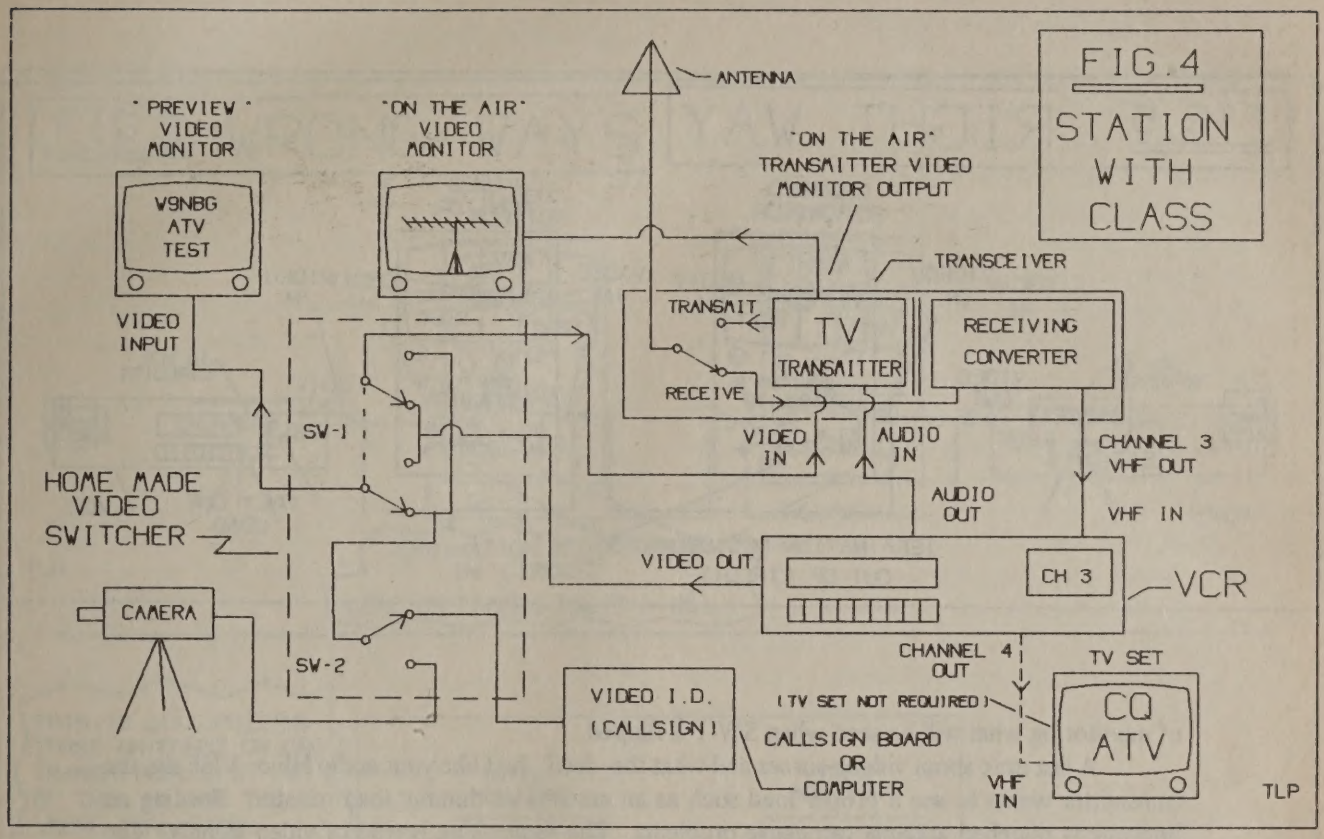



& white on the air. I just got one of these old computers for free, because hardly any one wants them.

3. About fifteen years ago there were a number of small computers about the size of today's keyboards, that were sold from computer stores to eventually drugstores. These computers used TV sets as there monitor. Some put out good looking color pictures, some produced only black & white. They almost all came with the Basic language built in. These computers can be programed to generate call sign IDs, test patterns and moving graphics. Some had a direct video output, but some only put out an RF. signal on TV channel 2, 3 or 4. The RF. output can be run into a VCR and used to make tapes with your call sign etc., or passed through the VCR and have video come out that VCR's video jack. That video can then be run to the Ham transmitter. Computers like these are stile available at flee markets, garage sales and hamfests, or could be sitting un-

# VIDEO SOURCES




der a pile of junk which most of us seem to collect in our basements.

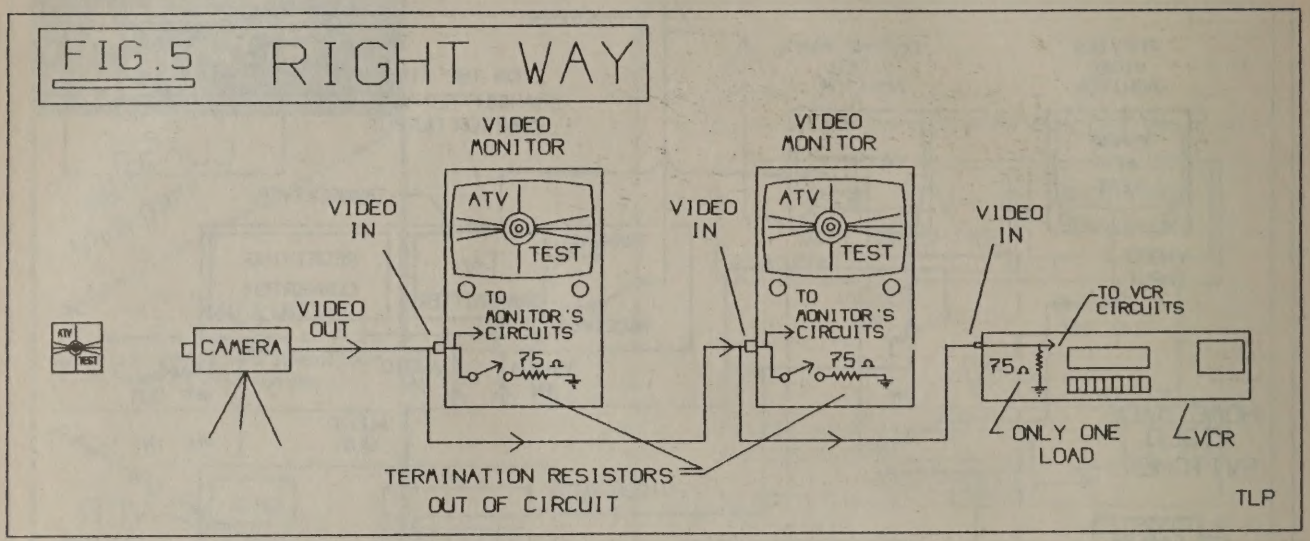
Kodak makes a stand alone CD-ROM video source. Gather together your pictures, slides, TV test patterns you make or buy, and IDs made with your call sign, and send them off to Kodak for processing in to a CD-ROM. You will have over one hundred pictures to show on the air, and it all comes from a little device the size of a ham sandwich. The CD-ROM can also be used with a computer.

If slow scan television is your interest, some slow scan equipment can do double duty. I use my Robot 850 to generate my call sign ID. and store it on my Robot 400. The big black letters on the white background look just fine coming out of the video monitor jack on the 400.

Lets put a bunch of these sources together into a station a little more fancy than Fig. 3. Understand that it is not necessary for you to have more than one video source to get your station going. Some ATVers who are mostly interested in DX and just the minimum pictures necessary to work DX will think what is to follow completely unnecessary, and their right. But I am one of those hams who wants a station that caters to the show and tell side of ATV. You may have seen some pictures of ATV stations that look like the control room of the big boys down town, I must confess that I lean in that direction. Watch out for it can be over done. I ended up putting so much video equipment in the ham shack that after not using it for a few months, I could not remember what switch did what.

Figure 4 expands on Figure 3 by adding a number of video sources to the station that can be switched on and off with a simple switcher. One must remember that video signals, unlike audio, have a very large band width, 0 to 4 MHz. Some switches will hurt the picture quality. I have tested a few miniature toggle switch from Radio Shack and have found them to be just fine. 75 ohm coax must be used to connect the video equipment together, and very short wires (2 to 4 inches) inside the switcher should be used. The video switcher in Fig. 4 allows for 3 video inputs and a way

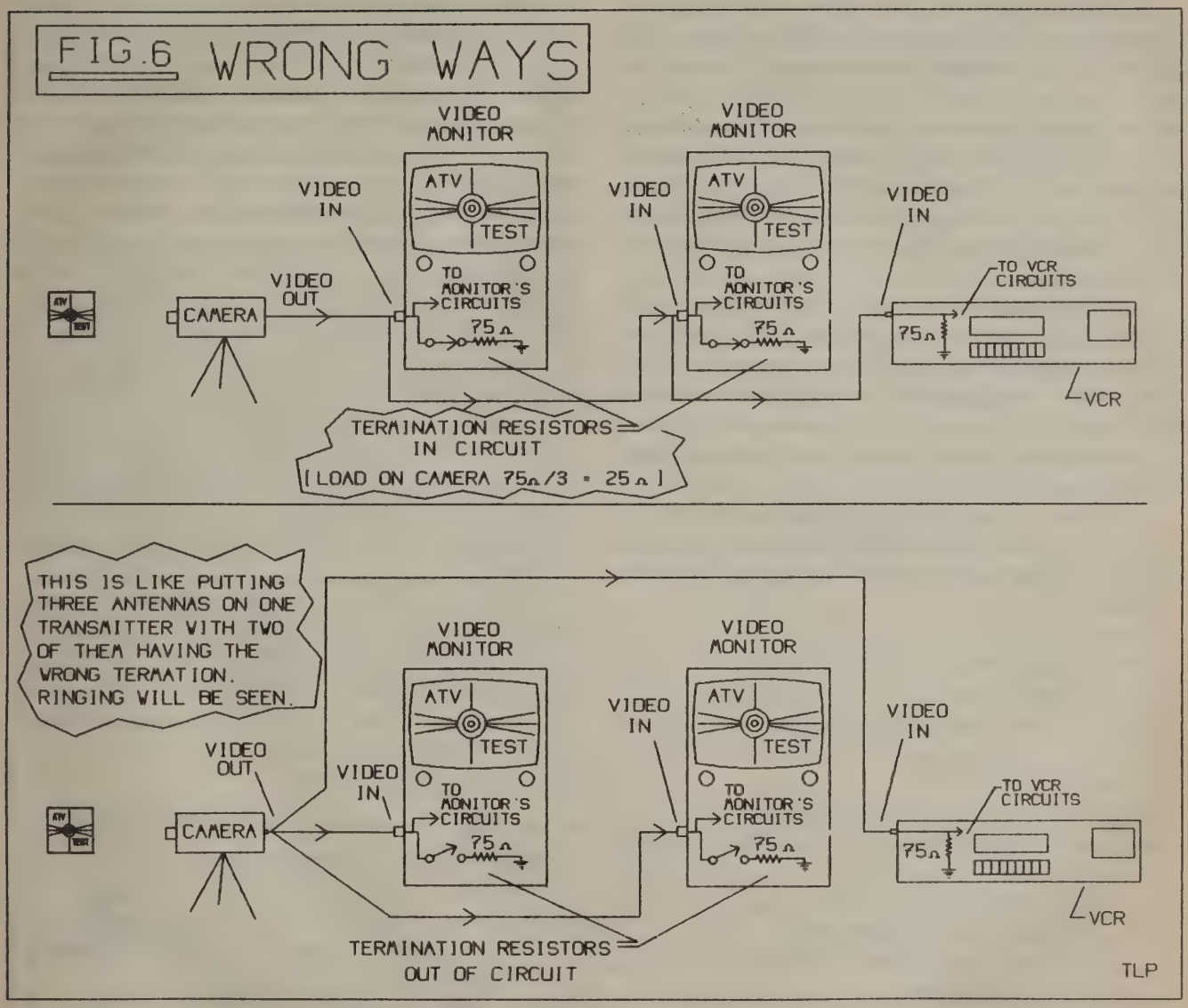
# VIDEO SOURCES




of monitoring what will be seen when SW-1 is flipped.

A last note about video sources and what they feed. Just like your audio HF or VHF rig, the transmitter wants to see a proper load such as an antenna or dummy load resistor. Feeding an improperly matched antenna can cause problems. The same thing is true of video signals. The source is 75 ohms and the input to the monitor, transceiver, VCR is 75 ohms. When they are connected with 75 ohm cable all is well. But if two monitors, or a monitor and VCR are to be feed from one source, only one of them can have the termination resistor. That is why some times you see monitors with a switch labeled "TERM ON/OFF". Fig.5 shows the proper way to connect (daisychain) these items. The termination must be at the end of the line, and the cable to the units in the middle must be right to their connectors. Fig.6 shows a number of ways which are WRONG. The result of these wrong connections is poor looking edges on the picture (or ringing) because of standing waves in the coax. This is the same problem you run in to with your transmitter if the antenna is not matched right. See this video stuff is not so mysterious after all.

# VIDEO SOURCES



# THE NATURE OF VIDEO

**by Henry Ruh KB9FO**

Because our world has become largely plug and play, we tend not to think about the WHY of things. This is as true of video as many other areas of technology. The modulation and demodulation processes for video are different than other modulation modes. Even though it is a simple AM modulation, there are considerations that apply to video that do not apply to other forms of amplitude modulation. In addition, there are special concerns when using FM modulation and even digital modulation to transmit video.

If video were symmetrical and sinusoidal, as audio is, there would be much less to concern ourselves with. But video is not symmetrical, and it consists of not only sine wave but square and triangle wave components. And while Fourier analysis of the waveform can convert all the signals to combinations of sine waves, we don't transmit Fourier transforms, we transmit video.

When we deal with video signals, we need to concern ourselves with the following items, which I will explain individually after the list. Many items are inter-related.

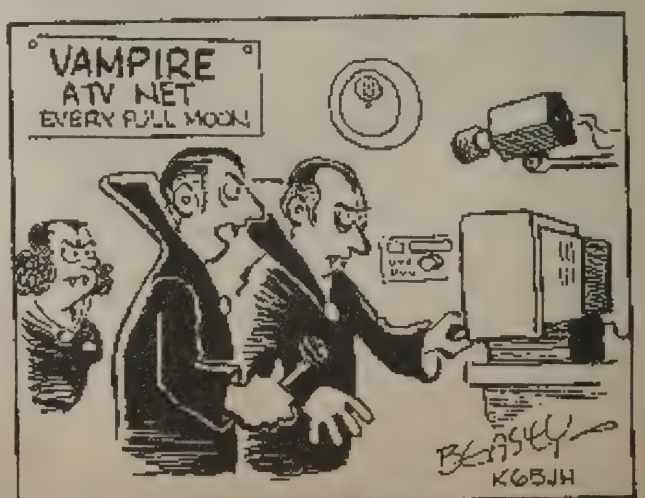
1. TERMINATION
2. CONSTANT SYNC AMPLITUDE/VIDEO GAIN CONTROL
3. DC CLAMPING
4. AC AND DC VOLTAGES
5. VSWR
6. SUBCARRIER FREQUENCIES
7. INTERMODULATION
8. SUBCARRIER INJECTION LEVELS
9. SYNC TIP CLAMPING
10. PEAK WHITE AND PEAK BLACK LEVELS
11. SYNC BUZZ, VIDEO FREQUENCY RESPONSE
12. HARMONIC AND SPURIOUS SIGNAL GENERATION
13. RECEPTION/DEMODULATION
14. POWER BANDWIDTH
15. PRE-EMPHASIS/DEEMPHASIS
16. AUDIO DEVIATION LIMITING

## TERMINATION

Even before we even consider modulation, we have to consider the video signal level. All video equipment is designed to provide a 1 volt signal P-P when terminated into a 75 ohm resistor. An unterminated (open) video output will often show 2 volts peak to peak, which is then 1 volt when terminated in a 75 ohm resistor. If the termination is precisely 75 ohms, we will have a proper video signal which consists of video, blanking and sync.

If the termination is not 75 ohms, then your signal level will not be the 1 volt expected. It will be more or less depending on the ratio of the termination value compared to 75 ohms. The use of an 82 ohm resistor will cause the voltage to be wrong by nearly 10% Because video is logarithmic not linear, 10% becomes a very big value. If you connect a camera to a monitor, then take the "loop through" output of the monitor to a transmitter, the signal should be terminated at the transmitter in the proper 75 ohm resistor. If the monitor has a termination resistor, as most do, you need to turn it off. If you don't, you have two 75 ohm resistors in parallel, or 37.5 ohms termination and the signal level would be HALF of the 1 volt desired. This would make the picture very dark and the contrast level low. You would now begin a game of catch 22 as you turn the brightness and contrast levels up to compensate, then turn the video gain of the transmitter up, never knowing where the correct settings really are.

Do not build or use a transmitter that does not have the proper input termination impedance (75 ohm resistor). If your monitor is designed for 75 ohm operation (as most are) and your transmitter has a value other than 75 ohms, you will never see the actual proper picture brightness and contrast. In other words, what looks good to you, will not look good to those receiving your signal!

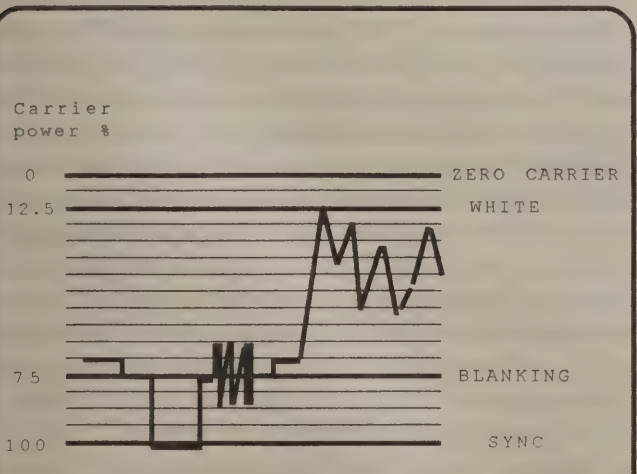


# THE NATURE OF VIDEO

The input should also be AC coupled. Today many cameras have a DC voltage present at the output. This DC voltage will cause havoc in a direct coupled amplifier used as a modulator, since it is effectivly an additional bias signal, causing the following stages to operate at the wrong bias point, thus compressing the sync or video.

## DEPTH OF MODULATION AKA CONSTANT SYNC LEVEL.

What we see on the picture tube is the video portion of the signal. What we do not see is the blanking and sync portions of the signal. When TV was being invented, thought was given to how to make the picture stable and how to deal with natural and man made noise. The most troublesome type of noise is impulse noise since it is normally regular in occurrence (occurs at a steady frequency) and is well above the normal background or Gaussian (white) noise present in all electrical circuits. White noise is what you see on weak distant signals commonly called snow, or you hear from the speaker of any radio as the rushing sound. It was recognized that the stability of the picture was the most important part of the signal, so the system was designed to have maximum power during the synchronizing pulse times. This made that part of the signal the strongest and most likely to be received even under noisy conditions. At the same time, it was recognized that if a noise pulse was going to be seen as white dots, they could easily overload the CRT electron beam, causing a tiny dot to bloom out and appear as a bigger dot, obscuring more of the picture. So with the signal inverted, white being minimum signal and black being maximum picture power, strong noise pulses appear as black dots or holes, and making them self extinguishing. They are in effect stronger than the blanking level of the signal and the amplitude is then not important. Since the video information is always less than maximum power, we call this negative modulation. On a watt meter, a transmitter with no video or sync will show maximum power, say 10 watts. Adding sync, produces a signal which is only at maximum power for a short time, and at less than maximum power the remainder of the time, so the watt meter now will read about 6 watts. If we now add video, the average level of the video (between black and white) is even less power, so your watt meter may now ready only 3 or 4 watts. An all white picture would show about 1.3 watts on your watt meter (an average reading device) even though your transmitter is still putting out 10 watts during the sync pulses. In other words, the brighter the scene being transmitted, the less your average power level.




Relationship of carrier power (transmitter power) to video level

While a video level control can be added by simply adding a shunt or series variable resistor to the video input, this is not proper design. Keep in mind that we want a constant ratio of sync to video levels (7/10 of the signal is video, 3/10 is sync). In television we measure this as 140 units with 40 units being sync to blanking, and 100 units being blanking to white. In addition, we allow 20 more units between zero carrier and white so there is always some signal present at the receiver. Thus in a transmitted signal, we measure 160 units from maximum power (sync) to zero carrier). This is called the proper depth of modulation, roughly 26 dB. Video is never 100% modulated.

If we vary the entire sync/video signal up/down from 1 volt, while the ratio may stay the same, the amplitude of

the sync to blanking level will change. But the receiver wants to look for a constant sync level so it can easily decode the sync pulses to make a stable picture.

In order to do this, we need to have a means of turning only the video portion of the signal up/down, while maintaining constant sync (power) level. To do this, a diode is used to clamp (hold) the voltage at maximum during the sync, and a level control is then used to vary only the video portion from the set voltage (.3 volts typically) used for the blanking level. Now you can turn the video level to zero (fade to black) while still transmitting constant amplitude sync pulses. The receiver will remain locked no matter what you do to the video. If the transmitter does not have sync clamping and video only level control do not buy/build it, as you will be very disappointed, and so will your viewers!

If you have an add on amplifier to boost your RF level, it is not likely to be linear. As a result, you will need to be able to adjust the sync and blanking levels to compensate for the RF compression of the following amplifiers. If these are not present, don't bother to build or buy the transmitter!

## DC CLAMPING

Because the video signal is not symmetrical, the average voltage of the AC portion is not zero, but a value which represents the average picture level. The value will be at one extreme when sending a white picture, and at the other extreme when sending an all black signal. Because the picture tube (and your transmitter circuits) have a "grid bias" voltage which is set by the blanking level, the DC value of the video is added or subtracted from this blanking DC level. If the value is low, the picture will become too dark and portions will not be visible. If the value is high, the picture will "bloom" and wash out, in some cases we could see the retrace lines on the TV set before DC restoration became the norm. It is important to retain this DC component of the video, and in fact the reason we cannot send video as SSB, but have to retain a portion of the lower sideband (thus a vestige of the sideband...vestigial transmission) is to retain the DC level information. In the transmitter this is set by a bias control, which sets the operating point for the blanking level of the video signal. This is not much more than another diode and resistor which set the bias, or operating point voltage of an amplifier stage so there is constant blanking level. By now you must realize that there are two fixed voltage points in the modulation circuit, the sync pulse and the blanking level in order to maintain these important parameters of the video signal.

There is also a third voltage point that you do not want to exceed. This is usually set with a fixed resistor. Because you never want to have zero carrier level, you want to maintain at least a 10% carrier level, it is important to limit how high the white video levels can modulate the signal towards zero carrier. By limiting the modulator to 90% modulation, easily by holding the actual modulator voltage to a value slightly less than the actual final RF voltage, it prevents the carrier from reaching zero. This prevents sync buzz in the audio. (We call it sync buzz even though it is caused by the white portion of the signal. We should call it over modulation buzz to be precise.)

## AC/DC VOLTAGES

Because of the set voltages to achieve proper video modulation levels, it is also important to have a regulated DC supply, and minimal AC ripple. Generally the use of a filtered but not regulated supply will not work well because the DC voltage is not stable enough and the supply will be modulated by the video waveform. Remember the RF amplifier is operating from near zero to maximum output. This variation occurs 15,734 times per second. The video also has waveform information up to 5 MHz in frequency, and if you are using an electronic character generator, you could have rise times exceeding 10 MHz. The low frequency AC power line ripple in an unregulated supply need be only 10 millivolts for an easily seen hum bar in your picture. This is a slowly moving dark/light band that appears to travel up the screen. A simple 3 leg voltage regulator type circuit, or pass transistor type regulator circuit will remove the hum from your picture. There also needs to be medium and high frequency bypass capacitors to keep the video modulation off of the power supply line. This is typically a large and small value capacitor (i.e. .1 mFd and 47 mmFd) in addition to the electrolytic filter caps on the output side of the regulator (Fig 5). Be sure to use a large gauge wire so the DC resistance of the power lead is low.

Most RF power amplifiers also require additional by pass capacitors in order to handle video modulation without blowing up a few capacitors on the power line!

# THE NATURE OF VIDEO

## VSWR

Not only does this apply to RF and coax, but also to video. A high VSWR in either the antenna or the video input cables will result in a loss of picture fidelity. Typically you will see ringing (or ghosts) or smearing (loss of "focus') in the picture. While inexpensive cable can be used, the use of 75 ohm video cable for video connections is preferred. Likewise check the VSWR of your antenna across all of your operating frequencies to make sure you do not have a severe gain loss or VSWR problem which would reduce your video frequency response.

## SUBCARRIER FREQUENCIES

When we transmit video, we also send along a couple of other signals: Color and sound. The frequencies of these additional signals were carefully chosen to produce the least amount of interference to the video. In equipment we generally use today, we need not worry about the color frequency being correct because it is common to use one oscillator which generates the color and sync frequencies. In our transmitter, however, we need to maintain the proper sound carrier frequency. First, because the receiver compares the audio carrier with the video carrier to demodulate the FM sound, and it is tuned for 4.5 MHz, we want our transmitter to be sending a 4.5 MHz sound carrier. Second, because we use 25 KHz deviation,, we don't want to be far off frequency or the sound will be distorted. Lastly, most receives have circuits which notch the video at 4.5 MHz, and if we are off frequency, the sound trap will not remove the audio from the video and it will be seen as a audio disturbance (squiggles) in the video!.

For this reason a stable oscillator circuit is needed. While PLL or crystal control is not required, it is generally better than a simple L/C tuned circuit.

## INTERMODULATION

This occurs whenever there is a non linear amplification of the signal. This can be from a filter response, or by mix products generated in an amplifier device. While there is little in the basic design you can change to make this better yourself, the design should present few places where intermodulation can occur. Because the three signals (video, sound and color) are modulated and amplified usually by the same final RF device(s) careful attention to the signal levels of these signals needs to be accomplished, and a means of adjusting the injection levels in order to minimize the IM products. The most common is called triple beat. This is a 928 KHz signal which occurs when the color and sound carriers mix in bad proportion to the video carrier, causing the 928 KHz signal to appear in the video as a diagonal series of lines (herringbone).

## SUBCARRIER INJECTION LEVELS

Because we use common amplification, it is easy to generate undesired IM products and also buzz or noise in the audio and video. If you recall, earlier I stated we never want zero carrier. For that reason we hold the white level to a minimum of 10% carrier (or 12%) level. When the audio subcarrier is added to the video carrier, the amplitude of the FM carrier is riding on top of the video waveform. Therefore, we need some amount of power for the audio. The typical level of hame audio is 15 dB below the video carrier, written as -15dBc. If separate audio and video RF amplifiers are used, a full -10dBc (100 watts video, 10 watts audio for example) can be used. (Broadcasters can use up to -7 dBc audio carrier levels.)

By holding the peak white to 10-12% power, and the sync to 90% power, we have 10% at each extreme for the FM sound carrier. The sound can now be received and demodulated without noise from the video. If the sound carrier is compressed (reduced) during either the sync or white periods, we have amplitude modulated the FM carrier, which will show as "incidental AM modulation noise" a fancy way of saying buzz.

The subcarrier level can be set by the manufacturer or can be adjustable to compensate for the use of external amplifiers.

## SYNC BUZZ

Although I have already covered the primary source of buzz in the audio caused by the video modulation, there is another source of this symptom. The NTSC television system specifies an RF bandwidth of 6 MHz. Within this we can safely modulate up to 4 MHz with video information.

# EFFECTS OF FOLIAGE

***(contributed by W8DMR)***

Low power link measurements through foliage were conducted over the course of a full year by **Noel E Evans** from the University of Ulster, N Ireland (e-mail: ne.evans@ulst.ac.uk ). A report with graphs was published in the **May 96** issue of **RF-Design** Magazine.

We all know that at the higher frequencies foliage can severely attenuate a signal. You cannot pick up a good enough GPS signal in the woods. That's at 1.7 GHz. However, effects can be noticed at two meters, and definitely at 70 cm ( the study was done near the 70 cm band ).

The measurements were done in N. Ireland which has a moderate climate with an average yearly rainfall of 750mm ( 29.5" ). The frequency of this study was **462 MHz.** The path was 2.4 km ( 1.5 miles ) long, the terrain a hilly countryside with fields , hedges and a large drumlin (oblong , rounded hill, a remnant from the last ice age) with tall trees and plenty of underbrush. Taking away the vegetation there was almost line of sight.

The results are very interesting: they show a clear increase in attenuation in the summer months of roughly 6 dB. The two graphs below provide some details.

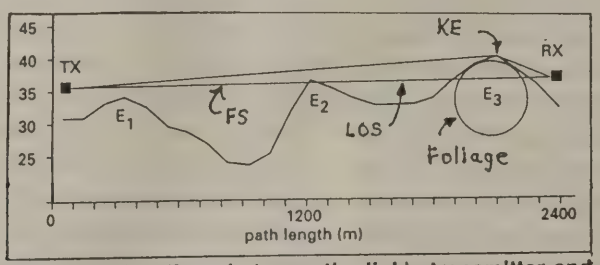



**Figure 1. Elevations between the link's transmitter and receiver. Losses include free-space loss, knife edge losses for each hill, rounded obstacle loss for E3 and foliage loss.**

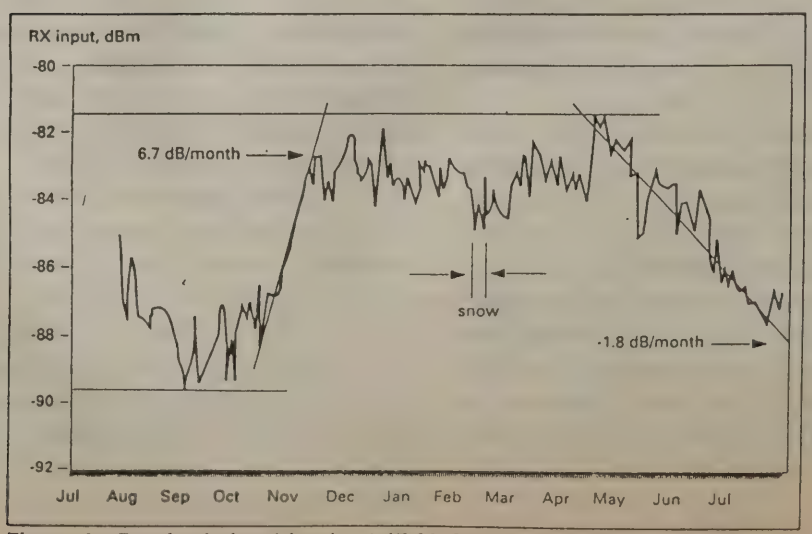
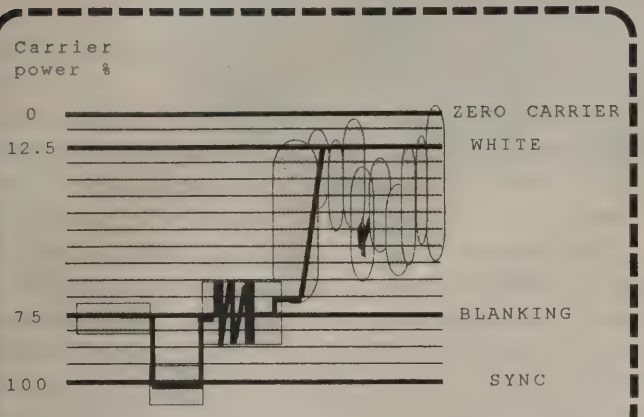



**Figure 2 . Received signal levels at 17:00 GMT, recorded using apparatus from July 1993 to July 1994.**

# THE NATURE OF VIDEO




The gray area represents the addition of the 4.5 MHz sound subcarrier, which rides "on top" of the video carrier. Even though the video was held to the proper level, the sub carrier is now going beyond the zero carrier and 100% carrier levels. Since you can't do this it amplitude modulates the FM sound carrier

This represents the AM modulation of the FM carrier due to the cli pping at zero carrier and compression at 100% carrier thus "sync buzz."

The resolution of a picture is determined by the number of TV lines the image can display. For example, a camera can be said to have 250, 400 or more lines of resolution. What it is referring to is the horizontal resolution, since the number of scan lines (vertical resolution) is fixed by the scanning system at 525 per frame, or 262.5 per field since the picture is made from the interlace of two fields per full picture, 60 fields, 30 frames per second. (Actually 29.94 to be precise). With a camera, the higher the resolution the better since it means a sharper image and more detail. Many professional cameras today have 850 or more lines of resolution. A TV line is considered as the black line, or the white space between lines. So a system with 800 lines could actually capture and display 400 alternating black and 400 white "lines." The number of lines of resolution converts to frequency at the rate of 80/MHz. So a 5 MHz video bandwidth equates to 400 lines of resolution. The topic of resolution could be a book in itself, covering the actual frequency response, aspect ratio, depth of modulation and aperture effects.

Electronic generation of a video signal is different than the optical generation since any optical system must divide the image into pixels, picture elements, the size of which is determined by the number of CCD sensors or the size of the electron beam spot on a vidicon tube. Because of the finite size of the physical device pixel, certain effects occur. For example, as the image detail increases, the ability to generate a complete transition from black to white decreases. Eventually the detail is too small to be discernable and the picture becomes a gray flat field. The detail can no longer be represented by black/white transitions. This is the cut off frequency or limit of resolution of the pick-up device. Long before this happens, the image will generate an alias. An alias is a false edge, or edges. If the edge of the object is not in perfect alignment with the scanning direction, there is a diagonal line to the image. Because on successive scans of adjacent lines, the image will first be in a position where it is seen by a whole pixel, then less and less, then none, then more and more until it is seen by the adjacent pixel.

The electronic generation of a signal, such as in a character generator (title making device) is limited only to the electronic rise time (volts per second) of the components. Thus it is quite possible to generate a signal which has a rise time of equal to a sine wave of 10, 15 or more MHz. Some cheap units have energy to over 100 MHz! Since these frequencies are outside of the bandwidth of the receiver, they represent segments in time when the signal cannot be fully demodulated. This causes the audio demodulator to have nothing to work with, and generates a buzz from the "holes." This is a simple way to explain the problem without getting into Nyquist filter response for the math minded.

The problem is easily solved by using a video low pass filter which limits the video to signals of 4.5 MHz or less. Since your receiver cannot discern a higher value than its IF bandwidth can pass, there is no loss in picture quality. Most home TV sets cannot demodulate video more than 2.5 MHz because of the methods used to separate the color from the luminance information. This is also why a computer

screen in a high resolution mode, always looks sharper than a TV screen. The computer imageis not being transmitted, and does not have a bandwidth limitation from RF channel width. But it is also why your computer can generate interference from its higher scan and video and data signals! A properly designed TV transmitter has a video low pass filter built in. If it doesn't don't use it or buy it.

The video filter also helps protect other spectrum users from unnecessary sideband splatter caused by computer graphics or title generators since anything outside of the receiver bandpass is just wasted energy and QRM for others.

## HARMONICS AND SPURS

Modern transmitter design minimizes the generation and radiation of spurs and harmonics. There is no need nor any desire to transmit more than the information we want to transmit, and it should be contained within the bandwidth of the mode, regardless whether it is FM, packet, SSB or video. Modern transmitters can eliminate these problems by design. Two common methods are to start at a low frequency, and them convert to the operating frequency, (hetrodyne process) or direct frequency synthesis, with the master RF oscillator operating directly at the operating frequency. The use of multiple frequency multiplier stages is no longer necessary or desired as it can be the source of spurs and harmonics and directly radiated interference if it is not designed properly. .

There are a large number of IC oscillators which will operate directly in the frequency range desired, for UHF and SHF operation to 2.5 GHz and beyond. This also reduces the parts count/cost of a project since the frequency multiplier stages and their multitude of parts are replaced by a single IC chip and a handfull of frequency determining components and master oscillator. The phase locked loop (PLL) is the most common method of generating direct on frequency RF signals. The devices allow both easy selection of operating frequency, and ease of modulation for FM mode video as well. With proper selection of loop time constants and output passband filters, the chip can produce a very clean carrier and the harmonics or spurs of multiplier stages is eliminated. Noise of the oscillator is a consideration for critical designs, but for our purposes can be ignored. By adding a passband filter and a MMIC (brick amplifier) the output of the PLL can be increased to the operating power desired.

The other method generates the TV signal at a low frequency, typically 45 to 70 MHz, which is then hetrodyned (up-converted) to the desired operating frequency. By changing the local oscillator of the converter, frequency agility is achieved to select the frequency desired within the band of choice. This also allows a multi-band transmitter to have but a single common modulated exciter, with operation on 70, 33, 23, 13 cm or higher achieved by using different converters and power amplifiers. This has long been the choice of SSB and CW VHF-UHF-SHF DX/ers, as it offers a clean signal with no harmonics or "birdies" to cause confusion in reception or QRM to other frequency users.

AEA used this technique in their ATV transmitter, and also incorporated a SAW filter to provide vestigial sideband filtering inside the unit. Reduction of the lower sideband can also be achieves by phase cancellation, modulating both the driver and final stages so that the lower sidebands are attenuated, as is done in the PC Electronics designs.

In any case it is good practice to have a VSB filter in the output of your system or otherwise limit the bandwidth of your signal to prevent unnecessary QRM. For a repeater it should be considered mandatory to have a VSB conforming output.

### POWER-BANDWIDTH

This applies more to tube amplifiers than solid state. It refers to the ability to not only generate the carrier power desired, but to generate it across the entire badnwidth of the signal. Generating a signal with a few KHz wide sidebands for voice is no trick. ETO/Erhorn makes very nice amplifiers and has written about the necessity for peak power in excess of 1500 watts to prevent distortion of the SSB signal because of instantaneous peak power requirements. The same is true for television signals, except our modulation can have sidebands across 4 or 5 MHz, requiring the generation of power across the entire bandwidth without loss of main carrier or low frequency sideband power (sag). Remember, there is a DC component to the video signal. If the DC component is altered by the power amplifier, the picture brightness and contrast will vary accordingly. In commercial TV, it is not unusual to use a 5 KW amplifier

# NEW FROM WYMAN RESEARCH INC.

**Model TSC-70**

Join the ATV DX Groups who are sending live pictures simultaneously with their fast scan television transmissions. Live SSTV images can be transmitted as audio on your "subcarrier" or the "on carrier" channel. Results are phenomenal. When DX FSTV Images are barely P1, the SSTV image is P5 (1000 times better). This is all possible with the new TASCO TSC-70 shown above. The small 6" x 6" x 1" size makes it possible to instantly connect to your existing ATV equipment without adding computers or frame grabbers as some SSTV systems require.

Call for the latest prices on the TSC-70. You can be assured it costs less than your 10 watt ATV transceiver.

**DC-2** **$109.95**

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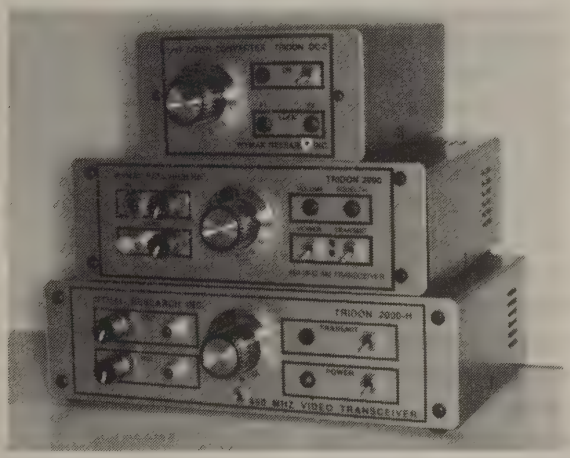

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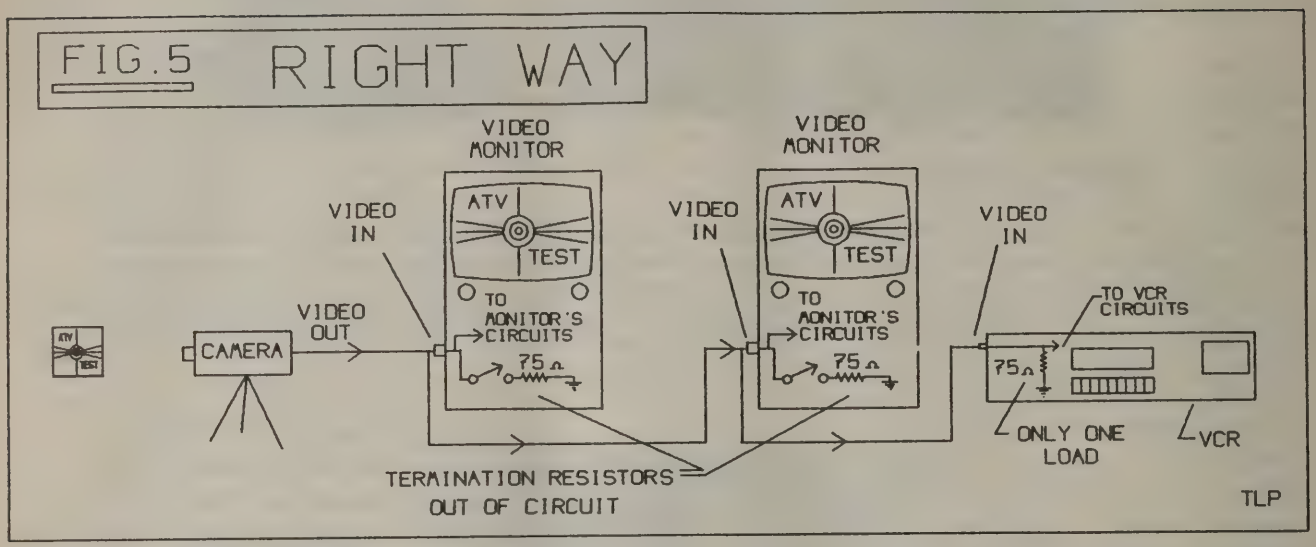


Correct video termination prevents ghosting and smearing of the video and maintains proper signal level.

circuit to generate a 1 KW video signal, so that there is adequate reserve for peak power/bandwidth demands.

Lack of bandwidth in and modulated amplifier stage will also affect the video response (resolution) and the ratio of color and sound subcarriers. In extreme cases found in old tube RF power amp designs, you cannot obtain sufficient bandwidth to transmit color or sound!

## AUDIO PRE-EMPHASIS/ DE-EMPHASIS

Television audio is FM. It is the nature of FM that the audio signal to noise ratio can be improved by boosting the high frequencies in transmit, and reducing them on receive to reduce the overall noise level. TV and FM broadcast receivers have built in de-emphasis circuits. Thus in order to have a flat audio response in your TV system, just as in your FM voice transceiver, you need a pre-emphasis circuit. This consists of a resistor and capacitor to achieve a boost curve of 75 uSec. That is the time constant used to achieve the desired response. The audio response is essentially not changed to 400 Hz. The rise begins slowly to 1 KHz, and increases to where it is about 14 dB at 15 KHz. Without an audio pre-emphasis circuit, your audio will sound muddy and be difficult to understand.

## DEVIATION LIMITING

Just as with voice transmission, you want to limit the deviation of the FM sound subcarrier for TV. Over deviation simply causes distortion and QRM. Good designs incorporate either a soft limited (two diodes and two resistors) or a compressor circuit (IC) to control the audio levels, help maintain consistent audio level and prevent over deviation. TV receivers require a 25 KHz deviation level for full audio output. So the transmitter should be adjusted to provide 25 KHz peak deviation.

This should be most everything you need to know to examine a TV transmitter to see if it has the correct technical charachteristics for good results and goood engineering practice. 73 Henry KB9FO

# *Emie Walker, WB3DVL, Silent Key*

In September, the Baltimore Radio Amateur Television Society, and the ATV community as a whole, lost a dedicated member and friend. Ernest Leroy Walker, WB3DVL, known for the red devil that was his trademark on ATV, died on September 12, 1996. Ernie was regularly on the BRATS ATV repeater almost from the first day it went on the air in 1976. He was an expert in a machine shop, and for many years made brackets, cavities, filters, antennas and other parts for the BRATS FM and ATV repeaters. He could handle any job, from the oversize brackets that attached a repeater antenna to a broadcast tower, down to filters and mixers for a 13cm repeater link. He was skilled enough to have been building a miniature steam engine from scratch.

Ernie was often in pain, yet from 1981 through last year he helped make bike tours, band competitions, walks, and parades safer. He was a regular checkin to the BRATS ATV net, as well as the daily ATV "Food Net" at lunch time. When he was unable to travel to a CAATN conference in York, PA, he helped demonstrate the ATV link between Baltimore and York, and thus was present in spite of his illness.

He was skilled in computer graphics, and amazed all with the speed with which an appropriate cartoon would turn up on ATV, regardless of the topic of conversation. Since his sister passed away five years ago, Emie had been livng alone. In a very real sense, the BRATS was his family.

When I first met Ernie, he was at a BRATS meeting video taping an antenna demonstration. He had two tables one on the other, a chair on the upper table, and himself perched atop the chair. When the whole thing collapsed, his first question was "Is the camera OK?" I wondered about his sense of priorities. As you read the following remarks made by BRATS President Bob Koblish, N3HAT, at Ernie's funeral, I'm sure you will agree that there was nothing wrong with his priorities in life.

I knew Emie as an independent fellow who didn't ask much of anyone. Yet he was always ready to lend a hand. If you needed something made or fixed, Ernie could do it, and would. He defined himself by his ability to make things, whether out of wood, leather, or metal. There is probably not a single site where the BRATS has equipment, that Ernie didn't make some part of it.

Ernie was generous with his time, from setup to teardown at Field Day, all night and all day at the hamfest, and at Public service activties. He gave of his time and also lent his equipment to the cause - radios, the antenna which he always brought to Field Day but never quite got around to installing on his own tower, the prize barrel - if he had it, it was available. Thanks a lot, Ern, we appreciate it.

A gentle soul, Ernie was still growing and learning new things, from amateur radio to leatherwork to computers. In addition to his curiosity, Ernie retained a child like sense of trust in his fellow human beings, a trust that others sometimes took advantage of. In the end, his body wouldn't take him all the places his mind wanted to go. But through all of his travails, he kept his sense of humor and played the hand he was dealt.

As a shy person, I sometimes find it difficult to hold up my end of the conversation. That was not a problem with Ernie - he was never at a loss for words. There were nights when I'd say, "Good night, Ern, I've gotta get to sleep," and we'd still be saying good night an hour later. His ability to time out a repeater is famous. But if you wanted some company at 2 in the morning, Emie would usually be up and ready to talk.

Emie, we know that whatever frequency you are now talking on, the band is always open, the pictures are P5, the sound is full quieting, and the repeaters never time out. Congratulations on your license upgrade, we'll talk to you later. Till then, we'll surely miss you. Good night, my friend.

Robert S. Bennett W3WCQ
E-mail: bobb@ketrontw.smart.net

# THE RUMORS STOP HERE

## TO BE OR NOT TO BE AN ARRL DIRECTOR

***There are two ways to create change.***
***By process or by dictate.***
***The first takes leadership,***
***the second only takes arrogance.***
***by Henry Ruh KB9FO***

As many of you know, I have a long history of political (FCC) action, to promote ham radio activity and increase our abilities to contribute to the public good. In any group there are those who would rather mandate their feelings on others rather than to try and persuade or invite open discussion and comment which might lead to different or better ideas. Leadership inspires those who want to follow a course of action, dictators demand a course of action.

Open meetings, and discussions to solve issues facing ham radio require that we listen to others and be open to change, modification and we must use logic and persuasion to achieve those ideals we feel are right. There, unfortunately, is always a contingent of people who feel that the "public" or the "membership" cannot be trusted to act "correctly." Those that feel that only *they* can have a correct idea, and no one dare challenge *them*!

There is usually a second agenda to those who spout such talk. The agenda is usually money or power. Control of others through an agenda that only allows "right thinking" individuals to attend meetings, only "right thinking" individuals" can vote, or run for office, or otherwise be blessed with the secret handshake. Orwell was correct in his work, "1984" in saying that political correctness will replace democratic process, examples abound everywhere from attempts to socialize medicine (*we* know what is good for *you*) to control of the minutia of every day life. This has been the path the ARRL has taken to "solve" the supposed "FM Repeater problem."

In the ARRL of old, there were "hero's, the Ed Tilton's, Lew McCoy's and others who were leaders in their fields. These have been replaced with the nameless, faceless people who have no outstanding achievements that new hams can emulate. The ARRL is in serious financial trouble. It is to be expected since virtually no one at HQ has ever had any business experience. I am told over 1.5 Million books sit collecting dust in a warehouse tended by three people, because they aren't selling. A gross mismanagement of press runs and costs. How much is lost for space rental and salaries tending to a non moving inventory?

We know full well how the ARRL has failed in it's attempt to generate new membership from the new hams. Hardly any are joining the League. Despite tens of thousands of dollars for Archie comic books, the median age of an ARRL member is still getting older every year. ARRL membership consists mainly of aged general, advanced and extra class hams. Some 35,000-40,000 are life members, a group that represents a continuing liability (subscription costs) but add nothing to the daily income (operating costs) of the League.

As with most "grand schemes" the ARRL gained little from the avalanche of new hams, despite spending huge amounts of money to get these new people into ham radio. Likewise, the ARRL, having chosen who could attend the St. Louis meeting, and thereby guaranteeing that their stooges would be elected, having been the sole funder of the expensive trips for a huge contingent of ARRL staffers to attend that and many many subsequent meetings (field day found them arm twisting in the middle of the continent, not operating) ARRL attorney drafted and filed the incorporation papers for the NFCC/SPOC/NFCO formed by the chosen politically correct, then the ARRL board of directors rubber stamped the agreement between the ARRL and the NFCC/SPOC, basically an agreement with itself (!). This to control the frequency coordination process, soon the license process, and all without the general membership being "wise" to what was happening. The questions are never posed to the menbership, only the dictated answers. Meanwhile we lost another slice of spectrum to be sold off to the highest bidder (no attempt to save it by ARRL).

I am told the recent fund drive to get money for a spectrum defense fund raised only $66,000 The League likely spent half that on putting their grand scheme for repeater control in place, and will spend the remainder trying to defend their newly formed corporation. Meanwhile their house is in financial flames, the ham bands are being sold off, and the general ham population has gained nothing, and in the end ARRL will gain nothing, but a handful of power hungry wanna-be's will have finally achieve by dictate, what they failed to achieve through personal achievement and leadership.

Into this fray (I asked a few, "Am I stupid to do this?") I decided to try and run for Director to see if I could make any dent in the monolithic thinking of Newington. I found a buyer for the magazine since ARRL rules prevent anyone with a ham related business from being a director (more on that later). I filed a timely petition with the re-

quired signatures. I was faxed and had personal calls from Dave Sumner K1ZZ, as the election committee reviewed my petition. Because the sale was not completed by the deadline to file for election, by ARRL rules I was disqualified. Another opportunity will not arise for another two years. By then it will likely be too late. It may already be too late.

So since I was unable to run for director (even though my "ham business" had a tax loss of $29 last year) the sale was cancelled and we are back to square one.

The ARRL will continue to flounder until it has leadership which has had serious business experience. The owners of the major ham manufacturers, retailers and the management of other businesses have already proved in the market place how to make money and stay in business. The ARRL/QST is a business. ARRL hired a successful ham book marketer to market their products. When he told them how he planned to sell their products successfully, they told him no way, and he left. QST continues to order press runs in huge amounts above what they actually sell and every issue loses money as the print dozens of pages of ads for their products (preaching to the converted) rather than marketing their products to those who (the other 80% of hams who do NOT subscribe) don't read QST. The answer of the BOD? Raise dues! Haw many more will dribble away because of raising costs for falling value? QST could balance its books by dropping 16-24 pages per issue, but they don't have the guts to make some columns run in alternate issues to do it!

Meanwhile, the League spends tens of thousands of dollars to "solve" a problem that could have been solved through leadership and cooperation between hams, instead, the political wars will simply escalate. The ARRL is near broke, and a lawsuit or two from a disgruntled repeater group, the membership suing its leadership, will empty its till. And for what?

Even if the ARRL becomes the license issuer for the FCC, their financial resources will be instantly drained as they try to service 750,000 license holders with a membership base of about 115,000 dues payers, that they can't service at a profit now. How many millions of dollars will ARRL spend following its SPOC/NFCC/NFCO course before it collapses of its own financial waste? How much will they have to spend to defend themselves against charges of collusion and conspiracy in their dealings with the FCC to insure certain rules changes get passed, no matter what anyone else will want?

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Who will file the first class action suit when the 750,000 hams discover that their license privileges are now being controlled by the ARRL/SPOC, not the FCC that granted their license?

Maybe it is for the better that I did not run for office. Maybe it should be reserved for retired old people too feeble to object to anything the staff proposes, too disaffected to make any significant changes in the structure in order to stop the financial bleeding, too lock stepped to lead the ARRL or anyone else into the future of ham radio.

The nature of ham radio has changed. The dinosaurs will soon be dead, and they will take as much of the hobby with them as they can. The King is dead. Long live the King. Pity us who want to change course and save it.
OK, no more politics in this issue. 73 Henry KB9FO

# CHALLENGE YOUR STATION!

## ...Take Your ATV Station Higher Until Your Giga *Hertz*

*by Art WA8RUT, ATCO Newsletter*

**No Pain-No Gain!** ..antenna Gain, Preamp Gain, Rx converter Gain, Power Amp Gain, etc., etc..the pain?..getting it all to work **successfully!....and** maybe a hit to your pocket book!

Masochist Techno-Geeks (you know who we are!) have been pushing video across the state, county, city and the street for some years now on the 0.9, 1.3, 2.4 and 10 Gigahhertz bands. The good news is that you no longer have to join the "Techno-Geek Club" to be successful on the Microwave ATV bands. If you are not receiving or transmitting ATV on bands higher than 70cm, the following discussion may be for you.

## The 33cm Band (902-928 MHz!

In Columbus, both AM and FM ATV is used. The antenna polarization is vertical. The ATCO repeater has inputs on 910.25 MHz (A5 ) and 920 MHz FMATV. In addition the ATCO Bulletin Board (touch-tone 285, "BUL") Transmits on 910.25 MHz with 10 watts, to a 10 dBd gain OMNI-vertical antenna. The bulletin board is up-linked to the repeater, but since it is an OMNI antenna, it makes a great signal source to tune up your antenna and converters/ pre-amps, etc. Several stations (including WA8RMC, KA8ZNY, WB8DZW, WB8CJW and WA8RUT) have transmit capability on 910.25. Most of the activity on the band is on 910.25 AM ATV with 920 FM ATV just getting started. If you would like a contact on 920 FM ATV, give WA8RUT a call!

Common Receive converters/receivers used on the 33cm AM ATV band include "Rabbit" (and similar 900 MHz video sender products) and the PC Electronics TVC-9 Converter ($59)/TVC9G, in a ready to go package ($99). FM ATV Receivers/converters include LNB Satellite receivers which cover 900 MHz and can be found in Hamfest flea markets for $10 to $25 and HF Technologies makes high quality converters and 70 MHz IF for FM ATV. The two units will cost just under $500. A less expensive (but lower performance) way to get a converter on FM ATV is to use a converter like the TVC-9 (with a 70 MHz IF) to a LNA (70 MHz) Satellite receiver. This set-up will work better than a LNB receiver alone. Wyman Research (Waldron, IN) makes the DL which is a dual band 900 & 1200 FM ATV Receiver for $275. The DL- I is a Satellite PC Board repackaged into a small box. The DL-I works better than most Flea market receivers, but still could use a good preamp, but you do get two bands in one small box!

Transmitters on 900 MHz include the PC Electronics TXA5-33 1 watt transmitter board for $139, plus if you want sub-carrier sound, you will need the FMA5-F sound board for $39. Packaging the transmitter and sound board is easy. I recommend that you mount the transmitter in the box such that the output connector can be soldered directly to the board. Pauldon associates (Tonawanda, NY) sells "Rabbits" (Transmitter and converter) with output and input connectors already installed for $69. Pauldon also sells power amps (8-1 Owatts) for the Rabbit for $99 to $125 depending on kit or assembled. A high quality FM ATV 1 watt transmitter is available from HF Technology for $380. Wyman sells 900 MHz FM ATV transmitters with 5 watts out for $360 .

Antennas for 900 MHz include loop yagis, make or buy (Directive Systems or PC Electronics Model 3318LYARM- $95). Back issues of the ATCO newsletter contain plans to make a 900 MHz loop yagi. If you want an OMNI directional antenna, (as well as small yagis) antennas made for cellular service can be found in the flea markets for $10-$25, Gain from these antennas is typically 3-5dBd. Comet makes the FP-I9 10 dBd antenna ($119) for 900 MHz. Be sure to use 9913 or better feedline!

## The 23cm Band (1.240-1.3000 GHz)

The output of the ATCO repeater is on 1258 MHz (soon to be 1250) FM ATV and the input on 23 cm into the repeater is on 1280 MHz FM ATV. The antennas are horizontal polarization. Most of the activity in Central Ohio is FM ATV, although some A5ATV capability is still retained by some ATVers. This is a great band to watch your 439.25 or 910.25 signal into the repeater. WA3DTO, WB8URI and W8RVH are our "Big Guns" on 1.3GHz FM ATV

# CHALLENGE YOUR STATION!

## ...Take Your ATV Station Higher Until Your Giga *Hertz*

Receiver/Converters for 23cm. Many ATVers start with an LNB satellite receiver which can be found at many hamfests for $10-25. I have bought 10 or 12 of these receivers and about 70% work fine (The rest go in the junk box!). When shopping for a satellite receiver to use on 1250 MHz, make sure its an LNB receiver with an IF of 950-1450 MHz (not an LNA receiver with 70 MHz IF). With a good antenna and feedline, P5 pictures are likely from the repeater with just the LNB receiver. The LNB receivers are not very sensitive and you may wish to add a preamp if you live far from the repeater or want to watch other stations direct. The Down East Microwave 23LNAWPQ available from Down East and PC Electronics ($100) mounted at the antenna can not be beat! If you are going to use the same antenna to transmit, you can't mount the preamp at the antenna (it's not switched!). Pauldon Associates makes a switching type for $179. HF Technology Inc. makes high quality Receive converter (RXI 300-$229) and a IF 70 MHz (IF70-$249).

Wyman makes a receiver based upon a satellite board that will receive both 33cm and 23cm and outputs video and sound to your monitor or VCR. I have used the Wyman receiver for several years now and it's become my standard to judge the performance of other receivers. It costs about $275 from Wyman.

FM ATV Transmitters on 23cm are available from Wyman (5 watts out $369) and HF Technology (TX1300) 1 watt for $360. The Wyman is a two crystal unit and the HFT unit is synthesized for the entire band with 3 channels selected from front panel. Pauldon just recently introduced a 50mw 23cm FM ATV exciter for $219, but you will need a power amp to get into the repeater (such as a low power brick). Both Down East Microwave and Pauldon sell 18-20 watt power Amps for 23cm.

***[Ed note: The Houston ATV Society makes a great 13 cm band FM ATV TX which puts out 1-3 watts, see story elsewhere this issue.]***

Antennas for 23 cm can be anything from a 1/4 wave in "Coffee Can", a dish with proper feed, yagis style antennas still work and loop yagis are a good choice. Antenna selection depends on what performance you need. Loop yagis are by far the most used antenna because of their broad band width capability and ease of mounting. Plans to make loop yagis appear in the ARRL antenna handbook. Some success has been obtained with building the "Quagis" for 1296 also in the ARRL Handbook The loop yagis are a much better choice. N8KQN has recently built a couple loops for 23cm. Ask Ted for help. Directive System sells several versions of 23cm loop yagis and PC Electronics sell the popular types. The 2424LYRM 16.2 dBd Loop yagis sells for about $95. In all cases, use 9913 or better feedline (the shorter the better!).

## The 13cm Band (2.3-2.45 GHz)

In the works for 1996 is to add a 2.441 GHz FM ATV output to the current ATCO repeater. The 2.4 GHz transmitter is currently connected to the ATCO bulletin board and is activated whenever the ATCO Bulletin Board is touch toned up. The 2.4 GHz transmitter is running 0.5 watts to a 15 dBd OMNI, vertically polarized and is located near WCMH Channel 4's old tower and studio (same as the 910.25 output). A 10 watt Power Amp is expected to be added in the next few months. On this band, LINE OF SIGHT is the basic rule! WA8RUT, W8DMR, WA8RMC, KA8ZNY maybe able to give you hand on this band.

Receiver/Converters for 13cm include converters made for (M)MDS (wireless cable) but tuned lower in the band. Some of these converters I have purchased at hamfests will tune directly to 2.4 GHz; others will not. Most of these output on channel 7 or 8 and will work for "slope detecting" the 2.441 FM ATV transmitter. I did buy one of these MDS converters at a hamfest and its output was close enough to 70 MHz that I was able to connect it to a LNA receiver and have good quality FM ATV video on 2.441 GHz.. The overall sensitivity of the receive system was nothing to write home about! But since I've never paid more that $15 dollars at a hamfest for an MDS converter and

# CHALLENGE YOUR STATION!

## ...Take Your ATV Station Higher Until Your Giga *Hertz*

antenna, I figure I got what I paid for! On the other end of the cost spectrum is the HF Technology RX2500 with a HFT IF 70. The cost of the pair will run about $450 for a high quality 2.4GHz FM ATV receive system that outputs video and sound. ATVQ carries an ad for a 2.4 GHz receiver/transmitter system for $180 that is similar to a 900 MHz "Rabbit." Damark, the mail order house advertised the same thing for a few dollars less so I ordered the "Wavecom" 2.4 GHz "Rabbit" like pair and I have been quite impressed with them. Our 2441.5 FM ATV appears on channel 2 (the units are 4 channels) and the video was P5 with great color 500 feet away and not line of sight. I did not get a chance to see just how sensitive these units are, but they seem quite good.

Transmitters for 13cm FM ATV are much more limited in availability. Other than the 2.4 GHz "rabbit" like pair mentioned above, the choice is the HFT TX 2500 FMATV transmitter. This is the same transmitter that is being used on the ATCO Bulletin Board and is planned to be moved to the downtown repeater site in 1996. The HFT TX2500 is a 0.5 Watt fully synthesized (2390-2450 MHz) with a 5.8 audio sub-carrier. The cost is about a $1 per millwatt!

Antennas for 2.4 GHz include a Dish, solid or wire mesh with a proper feed point. Many of the MDS converters will come with a small dish or a rod antenna. A source of wire and solid dish antennas (around $60) is Phillips Tech Eelectronics in Scottsdale AZ. They also sell MDS and MMDS converters. Their catalog is worth having. Directive Systems also sells (about $100) a 2.4GHz loop yagis with 18-20 dB gain and I recommend this antenna.

## The 10 Gigahertz band

The ATCO Repeater does not do anything on 10 GHz ..yet! Activity on ATV on 10 GHz in the Columbus area is sparse. Much of the activity is via GUNNPLEXERS modulated with video. Surplus Gunnplexers can sometimes be found in flea markets for $20 $40. Advanced Receiver Research sells the M/A-COM 10 GHz 10mw transceivers units for $186/each. SSB Electronics and Down East Microwave also has some equipment that can help get on this band. WA8RUT & KA8ZNY can help get you started.

***[ Ed Note: SHF Microwave Parts (Alan Rutz) in Westville, IN sells a variety of Gunnplexers for ham use]***

## Does your Giga-Hurt yet?

The intent of this article was to provide the interested with a survey of ways to get video on the air by some other means than 70cm. The ideas and products & manufacturers mentioned here are by no means the only ones available nor do I recommend any one supplier over another! Most of the items/products discussed, I have some personal experience with -pro and con- that I am willing to share. I purposely did not discuss some of the less expensive (and more difficult!) ways to get on these bands because they do fall under the category of Techno-Geek applications! I am willing to share those approaches, but you will have to learn the technogeek secret handshake! If you would like to discuss your experiences or if you would like to ask any questions, please give me a call or 147.45 or my phone numbers are listed in the ATCO newsletter or send me e-mail to wa8rut@aol.com.

### GUNPLEXER BOOKS

A good reference is the Gunnplexer Cookbook by Bob Richardson W4UCH and published by the Ham Radio Publishing Group. Some of the Ham book suppliers might still have some copies - CQ Ham Radio Bookstore (516) 681-2922. Video modulating the Gunnplexer is a simple as capacitor coupling to the varicap line and adding the FM pre-emphasis network in series and a \,ideo gain pot to set the de\,iation to 11 MHz. The 1 volt out of the camera is enough swing without an ampliher stage. Sound is mixed in through a series resistor from a FMA5 subcarrier gen reset for 5.5 or your favorite satellite receiver audio frequency - they can be reset all the way up to 6.8 by cutting the slug in half and reselecting the 120 pF low pass filter cap. If your 75 ohm video coax run is more than 100 ft you might also consider a group delay equalizer. In So. Calif we use 10.250 for simplex and playing around and 10.400 as a repeater input on Santiago Peak (output is 3480 MHz - KC6CCC). San Diego has an interesting same frequency translator on 10 GHz with 10 MHz band width check out the 10 GHz web page for info. 73 with DC (well 420 is almost DC) to light ATV, Tom W60RGy

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I am not enclosing the usual color catalog in subscriber copies this issue.
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# ATV in Aircraft

## By Tom O'Hara, W60RG

ATV is being used more and more by RACES and emergency service groups for remote damage assessment as well as by pilot hams just for fun. There are a few special considerations for ATV in aircraft however.

I first put ATV in a helicopter for the Pasadena Police to enable them to get a bird's eye view of the chaotic traffic flow from the New Year's Day Rose Parade to the Rose Bowl in 1 968 (May 1968 QSTpage 106). In 1988,I installed ATV in my Enstrom F28C helicopter to demonstrate the feasibility of transmitting pictures of earthquake damage sites back to the Los Angeles County Emergency Operations Center. Today the LA county Sheriffs RACES operates ATV in four helicopters and many mobile ground units including orle portable repeater. There are also over two dozen city and county emergency service organizations in Southern California that use mobile and airborne ATV as part of their emergency communication operations.

For my initial flights, the video was noisy and puzzle since the noise did not occur on the ground even with the engine and rotor turning. Finally I realized that the braid of the RG58 coax to the antenna would vibrate enough to change contact resistance between the strands, and that would show up as an AM modulation from SWR change. The solution is to use Teflon double-shielded coax with tight braid. I suggest RG400, which you can possibly get from companies that do mobile cellular phone installations, or RG 162.

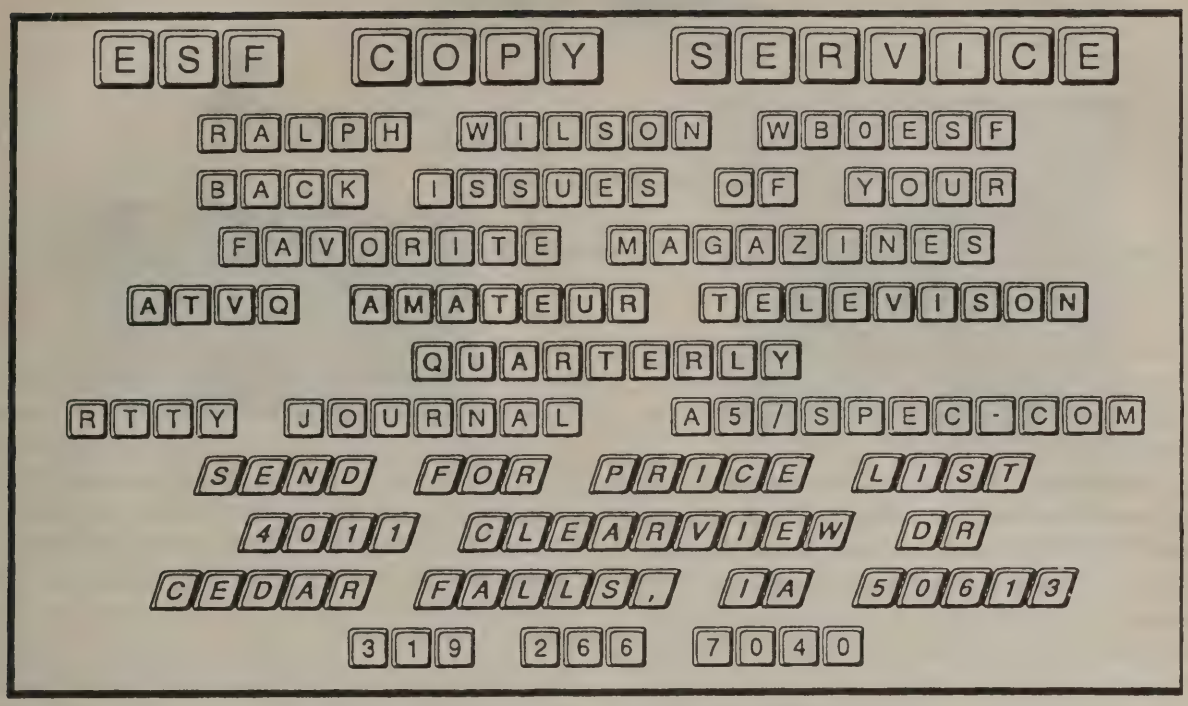
Antenna type and placement is another unique problem. What works best is a stiff quarter-wave spike on the belly. Ground planes have about a 15 degree up-tilt in the radiation pattern. Placing the antenna on the belly places most of the power toward the ground rather than outer space if mounted on top of the aircraft. Longer gain antennas have narrower vertical pattern lobes which can cause signal drop out nulls sooner when the aircraft banks. A vertical omni is the simplest and will give the best overall coverage in flight. Many are commercially available.

A horizontal omni is very difficult to mount since it must be placed away from the aircraft metal skin so as not to affect its pattern, and it will have much more wind resistance. The landing gear on fixed wing or helicopters can also interfere with the antenna pattern. Find out where your peaks and nulls are by having a ground station describe the signal strength changes to you on two meters as you make 360 degree turns. That way when you are shooting a significant scene you can fly your position relative to the receiving station as well as sun angle for the best video at the receive site.

For the antenna, I used 1/8" diameter solid brass rod about 6.5" long and then trimmed for minimum SWR. However you will have to find a ham-friendly FAA-certified radio shop to install your antenna or sign off your work to be legal. They may be resistant to installing antennas that are not made for aircraft. There is a company who does make FAAcertified antennas for the ham bands - Comant, (310) 9466694. They have both 2 meter and 440 MHz antennas. I have not tried it but I would think that one of their 2 meter quarter-wave antennas would also work as a 3/4 wave on 70-cm ATV. If it does, then you can use just the one antenna and coax for both bands using a Diamond duplexer.

The FAA says that anything that is fastened to the aircraft must be approved. To get around this, the ham equipment can be put in a plastic milk crate or opened suitcase and strapped into one of the seats. A gel-cell can be used to power the equipment or a cigarette-lighter plug into the vehicle's power, if available.

I suggest the TC70-10 ATV Transceiver for aircraft use. First, 10 watts shouldn't bother the avionics gear as long as there is some antenna separation—this should be checked out on the ground before taking off. Second, the 3 amps power draw is not too high to suck down a 12 Ah gel-cell all the way on a typical flight or be of any real concern to the aircraft's total current draw or wiring. Heat dissipation does not require a fan and will not adversely raise the cockpit temperature. If the aircraft power is 28 volts, a series regulator on a heat sink is still not so big as would be required if a higher power amplifier was added. Third, the line of sight snow free picture DX with 10 watts PEP on the 70-cm band is about 25 miles given the quarter wave spike and a 9 dBd Diamond F718 vertical omni on the ground. You can get farther if you have line of sight and a higher gain beam that can track the aircraft, or you don't mind a little snow. At 5000 feet the RF horizon over flat terrain is 100 miles. Your 10 watts on 70-cm will give a P3 to P4 picture that far away to a typical ATV station with a 14 dBd





beam.

Note that the lower the frequency, the farther the distance given the same power and antenna gains due to antenna area. So the 420-450 MHz band is suggested rather than 902-928 MHz, which would give half the distance, or 1240-1300 MHz at 1/3. However, you could make up some of the difference with higher gain beams. Every 6 dB increase doubles the distance for the same signal level, or improves the picture one P unit at the same location. The other bonus of using the 70-cm band is that the ATV can also be picked up on a cable-ready TV tuned to cable channels 57 through 60 with just a good outside 70-cm antenna. This makes it easy to have additional TV reception at other emergency service sites.

Check with local ATVers to find out the coordinated ATV frequencies so that you do not interfere with other band users or unknowingly key up a local ATV repeater. Using the local two-meter ATV coordination channel while airborne helps with getting signal reports and sparking interest. With only two ATV channels in the 70-cm band available in any given area, and emergency operations sometimes taking quite a while, coordinating on two-meters can go a long way in keeping other users patient.

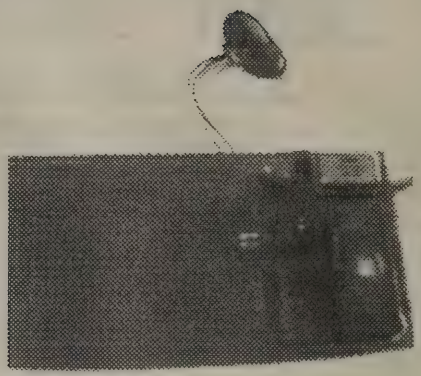
Don't forget to identify every 10 minutes and at the end of a transmission by voice on the sound subcarrier or call letters on the video. You can make a card up with fat black printing ofyourcallandthetwo-meterfrequencyyouarecoordinating on. RMD Technology makes a video overlay board which will put your call ID info on the screen for 5-10 seconds every 9 minutes to automatically satisfy the requirement. They also have boards that will overlay location and other information directly from a GPS receiver as well as your call.

Fourth, you many think you only need a transmitter in the aircraft. But a receiver is a big help to see if anyone else is on that you might interfere with before you transmit from your big antenna in the sky. Seeing the other ATV stations during an emergency operation will keep you from transmitting over them as well as giving you a better feel for what is going on. Which ATV station is transmitting is usually coordinated on two-meters but seeing the station actually turn off before you turn on, looks much better especially to the non-hams on the ground watching.

The little liquid crystal TV receivers are perfect for portable use. Some even have a video input which can be plugged into the transceiver's monitor output so you can see your own camera video for fine video gain adjustment rather than rely on comments from the ground. The TV/ monitor also makes it easier to see what

# ATV Toys

***This a simple audio beacon built from a pusling buzzer with a 9v battery and a key ring to attach it.***



*This is a simple 10 m CW beacon. It uses a crystal as a source and keys it with a clock chip, counter and it takes its' code from the EPROM. Simple design and runs well on a 9v battery and a voltage regulator.*

# ATV in Aircraft

you are shooting versus the eye piece types of camcorders. Only cameras with solid state pick-up devices should be used. The old vidicon cameras will get streaks or burns that can be permanent if accidentally pointed at the sun. CCD or MOS cameras or camcorders work the best. Hand holding the camera will dampen out the aircraft vibration rather than affixing it to a tripod or aircraft structure. Start with wide angle shots and practice tracking the scene on the ground in the monitor with slow steady hand movement. As you get the hang of it, you can try the zoom, because you don't want those on the ground to get air sick watching your video.

Hearing the two-meter FM voice coordination channel versus the aircraft communications in the cockpit can be a problem, especially if headsets are normally used such as in helicopters. Your aircraft radio shop can set you up with a pair of jacks for an external radio to select from your aircraft audio panel but the cost and complexity may be more than you want to do. I use an earpiece under the headset plugged into my HT or transceiver. That way the pilot does not have to listen to the ham chatter or juggle the relative volumes, but the camera operator can hear both the aircraft communications and/or intercom as well as coordinate with the hams on the ground via the two-meter transceiver. An ear piece can also be plugged into the TV to hear the ATV audio as well. Noise canceling or low-impedance dynamic directional mics work best for ATV in high noise environments. Do not use the omni mic that is part of the camcorder; you will pick up too much noise. It is tempting to close talk and shout into the mic so make sure you have turned the mic gain down low enough that your voice does not come out distorted. The mic audio controls are on the front of the ATV transceiver but you will have to go inside most two-meter transceivers to make the adjustment.

Airborne ATV can be a lot of fun as well as serving as a valuable eye in the sky for emergency service commanders. One word of caution however: Amateur Radio frequencies cannot be used for normal police, fire, CAP or government use except for RACES drills for emergency preparedness. See FCC Rules part 97.407 which limit operation to one hour per week, no more than two 72-hour drills per year and must be approved by the area's RACES authorities. It is tempting for some of these agencies to use ATV as an inexpensive tool for their normal business rather than their own microwave frequencies and type accepted equipment.

# ATV Toys

## And Their Practical Uses

**by Bill Potter N5MBM**

**[One of several excellent presentations at the Houston ATV Society ATV Conference, summer 1996.]**

When does a toy become not a "toy"? Because we grow old and put away childish things, does this also mean we must put away our"toys" also? Certainly not! Amateur Radio operators like so many other hobbyists pride themselves in their collection of paraphernalia to go with their preferred hobby. Most hams I know that have been into it for any significant amount of time can point to a room full of an amazing array of junk most of which actually works and proclaim "There's the SHACK!" As Hams we collect quite a few gizmos and gadgets that take up room in our "Shacks". Many of the smaller items tucked away into comers, holding up the bookshelves and stuffed into boxes are past projects, to fix projects and other unused miscellaneous gear. The old toys pushed away into the comers to make room for the new.

As Ham operators we tend to get into unusual projects. A perfect example of this is the South Texas Balloon launch team. They launch weather balloons with attached electronic projects to altitudes that only a few research aircraft have ever attempted. Remote telemetry experiments, data collection, experimental recovery systems, remote control and many other projects have flown on successive BLT flights. ATV has been a major component on most BLT flights. It lets the people on the ground fly right along with the package to over 100,000 ft. Now there is even telemetry overlaid on the video along with GPS data as well.

Many Hams have tried flying ATV on board model aircraft, rockets, boats, submarines, 4WD trucks and anything else that moves or crawls. Flying ATV on model aircraft and other models presents some interesting challenges. Following a fast moving aircraft with antennas, while watching TV and controlling the joysticks is not a job for the faint of heart. It takes skill, coordination and a lot of confidence. Some ATV fliers have gotten so proficient they can control the aircraft several miles away by only watching the TV screen and make high speed passes and aerobatic maneuvers. Some of the inflight video is amazing and will make the strongest of fortitude a bit sick to the stomach to watch the motion onscreen.

R/C model ATV presents some interesting technical challenges. On models to be used airborne serious thought should be given to transmission line, grounding and radiation patterns of antenna systems. Since most models are made of plastic, wood, cardboard and other materials you must give your antenna system some sort of electrical ground to work with. Quarter wave dipoles are popular for the relatively omnidirectional qualities and simplicity of matching. You should also keep your transmission and reception antenna systems in the opposite polarity. Keeping control in the horizontal plane and the ATV in the vertical plane or vice versa will help keep your signals from intermixing and causing some potentially very dangerous conditions. Enclosing your electronics in tinfoil or light aluminum boxes will help keep the rf out of them and using passthru caps for leads going into and out of the boxes. Using caps on the input and output power leads also helps. Tying all the grounds together with caps will also help the situation. Audio on board R/C planes will sometime distort the AM picture on 70cm so try to stay away from using audio unless you can seriously cut back on the level. Try to have onboard a simple 10m CW or simple audio beacon onboard. It will make finding that crash site one mile away a lot easier to find! These R/C aircraft can be used for aerial surveys of properties, pipelines, property lines, fences, search and rescue. reconnaissance as well as buzing the neighbors cows and livestock.

Rocket borne ATV is a way to get some high altitude, 400 mph heart thrilling flight time. The lift offs aresudden, the ascent is quick and the view from several thousand feet is incredible. For best results with maximum video time use an oversize parachute that is brightly colored. This is important for high visibility once

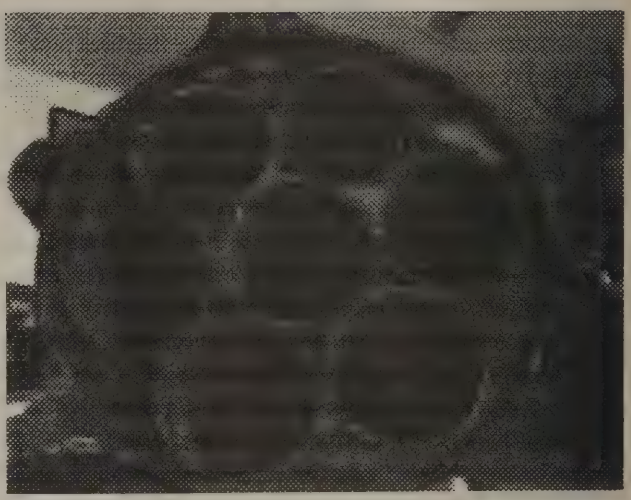
# ATV Toys

it hits the ground. Be prepared to hike a ways to retrieve your prize, the lengthy video will be worth it. Make it oversize for maximum hang time in the air. Make transmission antennas simple and preferably enclosed inside the nosecone for protection and ruggedness. Quarter wave antennas work better than gain antennas because of their more uniform radiation pattem. Always include a loud audio beacon of some sort that can run for at least 24 to 48 hours. This makes it much easier to find in thickets and high grass. Which is where rockets somehow always tend to land. Audio is nice to have on rocket ATV but most of what you hear is the rushing of air, and that's all. So audio usually shouldn't be of great concern.

*This is a complete rocket ATV outfit. From L to R: Battery box, ATV transmitter, 10m beacon antenna, 10m beacon and B&W CCD camera. The power supply is separated in case of failure, connections are usually soldered to stand up to the abuse of repeated firings. 10m antenna is a 1/4 wave dipole with the whip attached to a loading coil to make it shorter. The CCD camera is B&W and high resolution wide a semi-wide angle of view.*

If you are interested in rocketry you will quickly find that you will step up to the larger rockets to handle the heavy payloads of batteries and cameras. High Power Rocketry has its' own challenges one of which is you must become certified to handle class B explosives in order to purchase the larger rocket engines.

. Heavy battery packs and transmitters need a high power rocket to get to any great altitude. This rocket has flown to over 5,000 ft. on many occaisions.

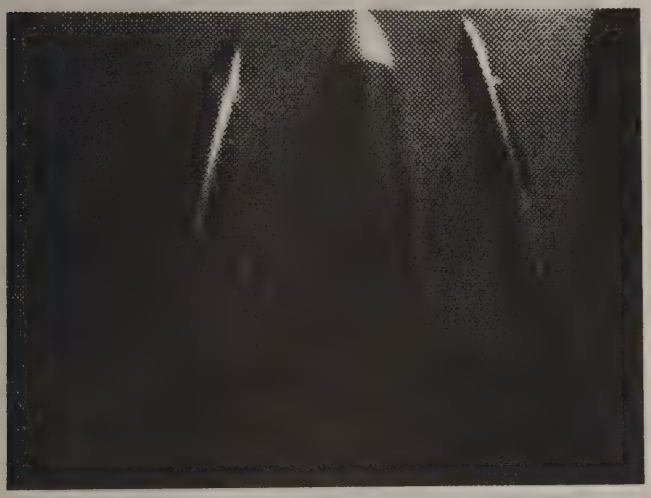


*This is the tail end of an ATV rocket. It is designed to handle 7 large rocket motors for simultaneous or staged ignition. With this large a combination you need an FAA flight plan and permission for launch.*

ATV aboard R/C boats and submarines can be a lot of fun. R/C subs can be used to inspect piers and pilings, the undersides of boats or check the traps you laid out yesterday without having to pull them up. You can play Jacque Cousteau without even getting wet! Check out the underwater world and swim with the fishes. Check out the big one that got away from you in his own environment. If you want to try your hand at ATV on subs take these tips to mind. Radio waves don't travel through water like they do air. Enclose your transmission antenna in rubber or some like material and make it water-tight. Also do the same to the reception antenna and place it in the body of water you intend to cruise around in. It is important that both of them are below water. Install a small strobe beacon that can be activated by the control receiver losing signal. This should make it much easier to find in 3 ft. of water along the lakes edge. Some rugged and cheap strobes can be had at Radio Shack sold as a jogger's safety strobe. Not enough can be said about waterproofing everything, that goes with having a sub.

Also protect with fuses the grounds as well as the hot leads connected to your power source in case of a small leak shorting something out. Place the strobe on it's own 1.5v power supply with NO fuse. Audio onboard a

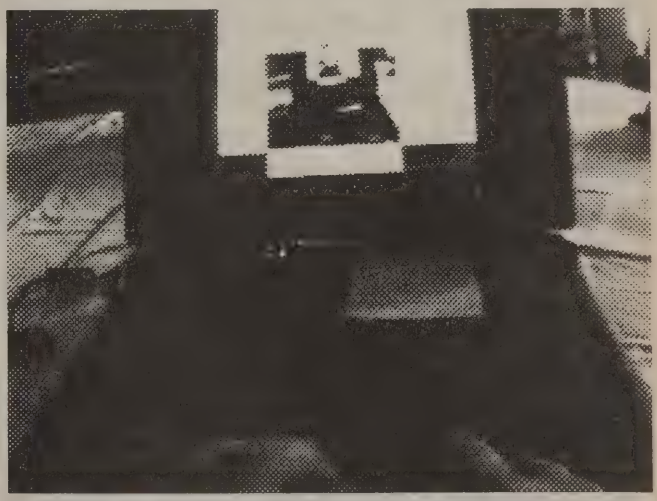
sub can be useful! It will let you know when there is an approaching boat and let you know when the motors are turning inside the sub, or you can hear the tell tale hiss of a small leak developing.



***These are examples of rockets capable of carrying payloads.***

***This is an ATV 'ROVER it is a true 4WD Radio Shack R/C truck with a 70cm ATV transmitter and a camera. It runs around the house and scares my wife's pets.***

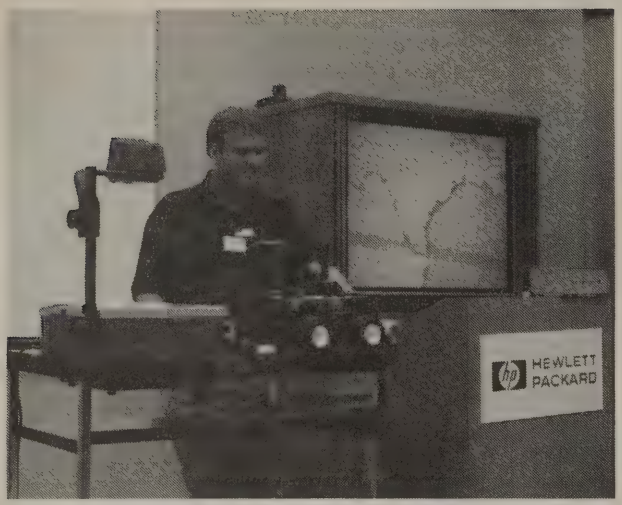
ATV on robotics projects lead to a better understanding of how the robot works as well as gives the operator sometimes much more precision over what he is doing. It can also let someone remotely control the robotic device from a greater distance than cables allow. Robots and R/C trucks and cars have an advantage. They can usually support a gain antenna of some sort. The rule of control vs. ATV transmission antennas still applies keep them in different planes to minimize interference. These devices can also carry more powerful transmitters because they aren't limited by take off weight and can usually tote some heftier battery packs. Beacons are usually never needed and audio is a must. When selecting an R/C truck, try to stay with true 4 WD as it is more powerful at carrying a load. Usually they aren't designed to carry a load which means it makes even more sense to get one of the more powerful models. You can drive an R/C vehicle around and listen to people's reactions, make the dog nervous and hear him whimper, listen in on otherwise private conversations and even chase the squirrels away from the bird feeder all by remote control.



***A simple laptop with a 28.8 modem and a Connectix Quickcam can get you on the Internet with video conferencing. If you want audio at the same time you will probably need to step up to a desktop with an audio card that has a microphone input. People all over the world are catching onto this and it is a lot of fun!***

With the advent of the Internet and such software packages as CU-Seeme ATV over the Internet is quickly becoming a fast growing past-time. People all over the world are connecting up to reflector sites that can broadcast video to hundreds of people at a time. Hams can use this same technology to have "nets" over the Internet and connect ATV repeaters in distant cities over common telephone lines

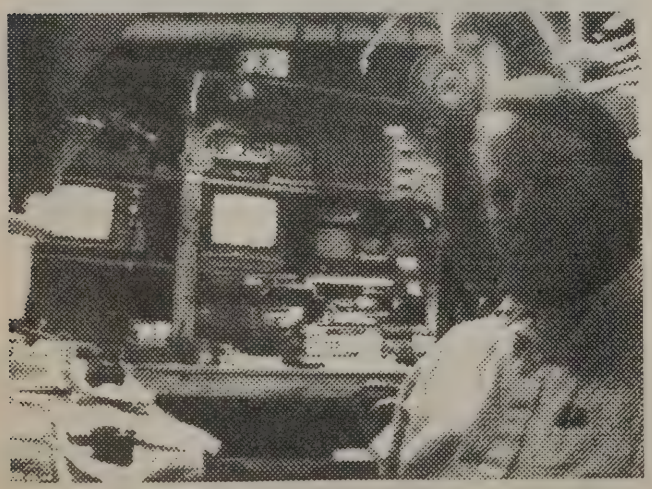
# ATV Toys




*Bill Potter, N5MBM, President,*
*Houston Amateur Television Society*

with only a PC, a camera and a high speed modem. Using a software package called CU-Seeme from Cornell University people can have live one on one video conferences with audio and video or connect to one of the many reflector sites and see other people from all over the world! The~e are emerging many other video conferencing packages that all tend to make videoconferenceing easy for everyone. With the advent of the Connectix Quickcam you can add a digital black and white camera to your PC for movies, still shots or videoconferenceing for under 100 dollars. And color for under 200 dollars. They all recommend a fast processor, which basically means a 386sx 16mhz wont cut it. You will need a 486 or better to really make it useful. If you want to run audio any Sound Blaster compatible sound card should work. Having a stable Windows plafform helps quite a bit as well. The more memory the better but it can run in as little as 8mb or RAM. Color across the Internet takes up a lot of bandwidth and makes your screen refresh time a lot slower so use it sparingly. People don't like it when you slow down the reflector. It brings new meaning to letting the kids "talk to, grandma", now they can actually see them too thanks to the Internet and the kind folks at Cornell University.

To say that ATV is limited to point to point or repeater operation would be major mistake and as you can see there are some varied and unusual uses for ATV in and around the shack, the lake and the air. To use these modes of operation to gather some interesting and exciting video to share on the local repeater is what we all want. It makes life a little more interesting. The building, construction and flight of our projects is only half the fun. Taking the video back to the shack, editing it and putting it up on the repeater for the next several months and showing it to all your buddies is the rest of the fun. We Amateurs and our toys are seldom parted, it is a shame you can't say the same for all the money we blow on our "TOYS".



***Live ATV on the Internet from the shack of N5MBM on a reflector in Helsinki Finland.***

# VS-90 ATV Repeater Controller

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**Enclosed in 19" rack mount enclosure with rear connectors.**
**Complete manual w/schematics, operational and programming details.**

**The VS-90 is dedicated for ATV repeater use. All video and audio switching is solid state with 75 Ohm video driver and op-amp audio output. During the repeater tail the video ID is transmitted. All timeout and tail timers are programmed with DTMF. For special events and applications such as Space Suttle transmissions a manual mode can be selected. Multiple receivers can be serviced with a repeat scan mode.**

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# ATV on 900 MHz
# Buffalo, NY

Our ATV group of Western New York has been operating for 20 years. During the earlier years operation on 439,25 MHz provided excellent results. Our DX records were Chicago, Illinois which whetted the appetite of our enthusiastic group. Michigan. Ohio, Permsylvania, and dozens of Canadian contacts were made. Afler a few years interest in the 439.25 MHz waned. which led to the group switching to 900 MHz.

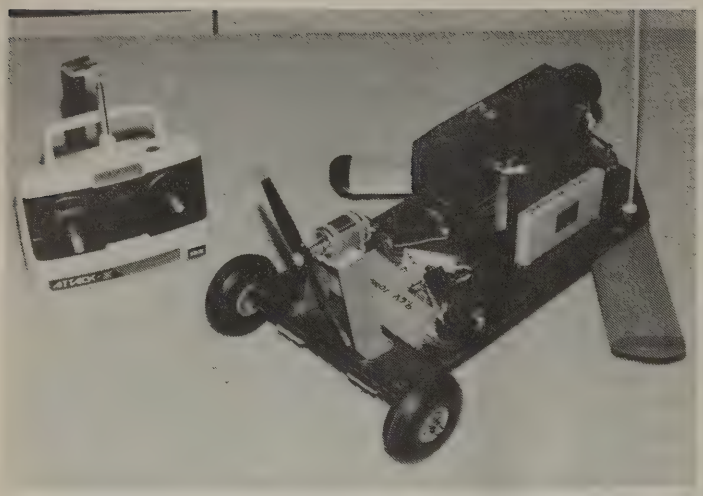
We started out using FM "bricks" as amplifiers and keeping the drive level low as to maintain linear operation as much as possible. We found operation on 33 cm to be very fascinating and very much different than operation on 70cm. No DX records, but communication at a distance of 16 miles with p3-p4 results. Power levels in the 2-8 watt range were used and a good Yagi or other type of antenna was required to obtain good results. We now operate on 923.25 and 916.00 simplex with repeater operation on 910..25 The repeater input is 439.25 MHz.

There are many 900 MHz ATV stations in operation using AM video modulation. It appears that interest is beginning to show in the use of FM video but the cost is somewhat higher than with AM operation presently. The use of FM Video is on the increase in various sechons of the country and the results appear to be gratifying.

When using 900 MHz operation, filtering is necessarv in urban areas due to the commercial interest in this band, however, this has not affected our operation in this congested md busy location. If you are interested in a new challenge, give it a try.

73

Don Fuller W2WHK, long time ATV enthusiast!



# THE DODO BIRD

BY LOUIS HUTTON K7YZZ

Like the Dodo Bird, this little project, even tho it has "wings", will never fly. It just runs around very fast on the ground ! ! This "car" is a development from my 11 year old grandson's recent visit. During his visit, he assembled a little wood platform driven by a small electric motor equipped with a propellor and powered by a single D cell battery. There was enough vibration in the thing to allow the drive system to propel it very slowly across a hardwood floor! That gave me an IDEA for a larger model.

The finished model shown in the photograph is 7" wide by 15.5" long. The rear wheels are 3" diameter model airplane wheels. The nose wheel is 1.75" diameter, again model airplane parts. The radio controll receiver is a Futaba FP-R112JE, 2 channel AM model airplane receiver. The control transmitter is a Futaba Attack lll unit. The nose wheel steering is controlled by a Futaba FP-S148 servo unit. The electric drive motor is a Silver Streak .035 and the propellor is 6" in diameter with a 3.5 pitch. The motor battery is home made from 8 each M Nicads at 1000 MAh. The receiver battery is also home made from 4 each M size nicads at 150 MAh. The electric motor control circuit is based on a diagram published in a model magazine several years ago. Works great. The video camcorder is a modified Fisher-Price PXL-2000 KiddieCorder. I removed the handle below the main camera body which originally held 6 each AA alkaline cells. I also removed the optical sight from the top of the camera body. These modifications had been made some time ago as I had originally planned to use the camcorder in a large model airplane, but ended up using 434 Mhz ham ATV equipment as described by my article in ATVQ. The camcorder battery on this little car is a 8 cell radio control transmitter battery salvaged from an old Futaba Attack IV control unit. The all up weight of the little car ready to run is 4 Ibs 2 oz. And it really goes...The electric motor driving that little prop makes it sound like a Cox .010 aas model engine !!!

The little camcorder uses a 90 minute high bias audio tape running very fast to give you around 5 minutes of video per each 30 minute side. The bandwidth of the video is around 30 Khz so the resulting picture has fairly large pixels, but is quite viewable. The format of the picture is 1x1, and is viewed on a regular TV set tuned to channel 3. I transfer that video to VHS format via a VCR and play the resulting pictures over our Amateur ATV net repeater. The viewers are very suprised at the little pictures that this model car produces. Its FUN...

It took a bit of road testing and debugging to get good noise free recorded pictures. Mechanical vibration and electrical inteference from the prop motor gave me some problems. A capacitor soldered across the electric motor's terminals cured that part of the noise problem. The camcorder was originally firmly attached to a mounting post on the car chassis, but road vibration caused problems which made the tape vibrate as it passed over the recording head. Foam padding glued between the mounting post and the camcorder body cured that problem. A clicking audio sound coming from the nose wheel steering shaft as it bounced up and down, along with rear axel vibration caused noise problems in the sound recording and some video interference. The mechanical steering system was tightened up and the rear axel was firmly attached to the chassis with clamps. This cured those problems after two test runs. Now, everything works as originally envisioned!!

This has been a very interesting project and my grandson just can't wait untill he visits again to get a chance to drive this little car. I sent him a VHS video casette of the car running around the drivewav and in the cul-de-sac. This really got his attention!!

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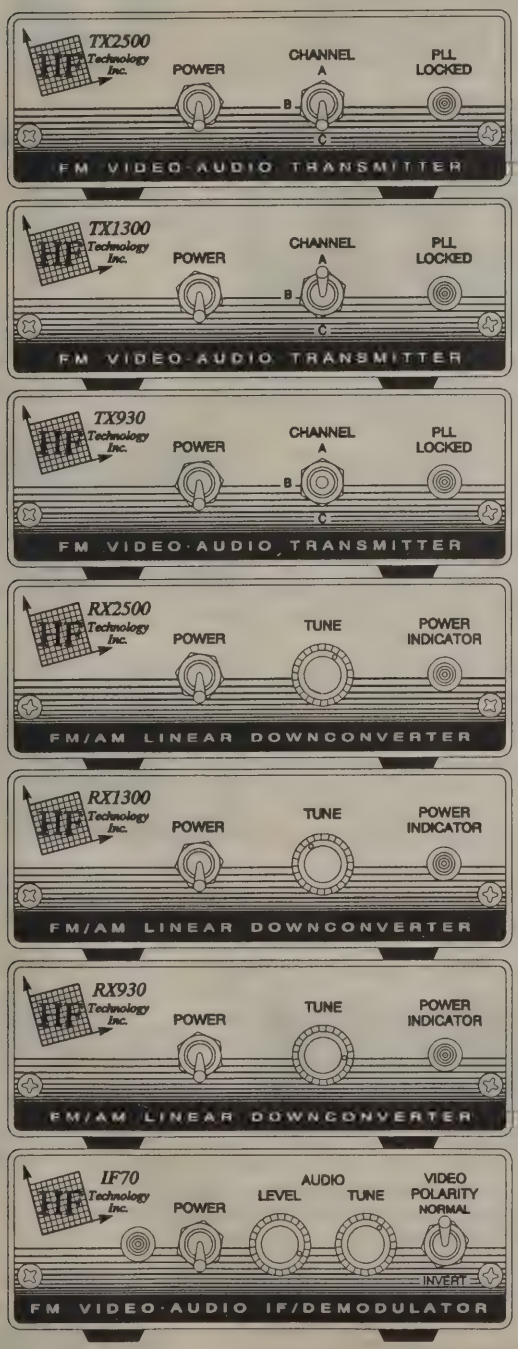


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- Low noise unconditionally stable MMIC front-end amplifier for sensitivity, stability and reliability.
- 2-pole interdigital front-end preselector filter to reduce out of band interference and overload.
- 6-pole interdigital bandpass filter for great image rejection.
- Optimized IF output filter provides spectacular rejection of local oscillator leakage and low dispersive effects.
- AM amateur television reception as well as FM amateur television reception when used with the IF70 IF/Demodulator.
- Low phase noise local oscillator resulting in unrivaled on channel sensitivity and adjacent channel interference rejection.
- Greater than 80dB linear dynamic range with virtually no spurious outputs. (The signals at the IF output are really received and not generated within the downconverter.)

## *IF70*

- The only FM video-audio IF / Demodulator specifically designed for FM amateur television use.
- Phase-locked loop video and audio demodulators "lock" on transmitters with frequency drift and maintain the utmost picture clarity.
- Tune in audio subcarriers from 4.5 to 6.5MHz (4.5MHz ceramic filters optional) with "Hi Fi" broadband response.
- Tight IF selectivity provided by a 16MHz wide Surface Acoustical Wave (SAW) filter.
- Optimal differential gain and phase response through the use of linear phase filtering in both the IF and base band circuitry.

**Call or write for complete specification sheets, ordering information and current pricing on these and other products.**

***Engineered and Manufactured Entirely in the U.S.A.***

HIGH FREQUENCY TECHNOLOGY INC.

P. C. Electronics 2522 Paxson Lane Arcadia CA 91007-8537 USA
Tel: **(818) 447-4565** m-th 8am-5pm pst (UTC - 8) Tom (W6ORG) & Mary Ann (WB6YSS) O'Hara
24 hr FAX order line (818) 447-0489 Email: tomsmb@aol.com

VISA MasterCard

# NEW PRODUCTS

## TX33-1b
**Transmitter**
**Made in U.S.A.**

**$329**
Delivered UPS surface in contiguous USA

**TX33-1b SPECIAL FEATURES:** **902-928 MHz 33cm AMATEUR BAND**

* ≥ 1W p.e.p. continuous duty transmitter properly matches Downeast Microwave 3318PA 20 watt linear amp with adjustable internal sync stretcher on the time proven TXA5-33 transmitter board.
* Built-in RF T/R relay board switches antenna and applied 13.8 Vdc between transmitter and your external 33cm ATV downconverter for simplex. No connection necessary for duplex or crossband repeat to 70 or 23cm.
* Full 25 kHz dev. broadcast standard 4.5 MHz sound subcarrier with independant mic and line audio controls allow voice over commenting while showing home video tapes. Uses FMA5 board. Accepts low impedance dynamic mics with "Push to Look" switch.
* Transmit RF detected composite video outputs to monitor phono jack on back to see what you are transmitting. In receive you see your own direct camera video at this jack to enable focus and lighting set-up before flipping the switch into transmit.
* RCA phono jack camcorder or VCR composite 75 Ohm video and line audio inputs, type N 50 Ohm antenna input, and 50 Ohm BNC output to 33cm downconverter connectors. Companion tuneable TVC-9G Downconverter is $99.
* Small rugged die cast aluminum shielded cabinet - 7.3 x 4.7 x 2.1", 1lb. 12 oz - same as the popular 70cm TX70-1b.

DX for snow free pictures in line of sight conditions using the Directive Systems 3318LYARM 14.3 dBd Yagi beams is 11 miles or 50 miles with the 20 watt amp. Just plug in your camera,VCR, camcorder, etc. composite video and audio, 33cm antenna, 12 to 14 Vdc @ 1A, and you are ready to transmit live action color or black and white pictures with sound to other amateurs. We stock 910.25 or 923.25 MHz, the most popular frequencies for simplex or repeater input. 911.25, 913.25, 914.8 and 919.25 MHz available on special order.

The TX33-1b has full bandwidth for color, sound and live action just like broadcast. You can show the shack, home video tapes, computer programs, Internet, radio club meetings, repeat SSTV, weather radar, or even Space Shuttle video if you have a home satellite receiver. For more basic info on ATV see the 1985 to 94 ARRL Handbook chapters 20 & 7, or new 1995-7 edition chapt. 12. For activity in your area check the ARRL Repeater Directory for local ATV repeaters or call or email us.

*Transmitting equipment sold only to licensed Tech class or higher radio amateurs verified in the Callbook for legal purposes. If newly licensed, moved or upgraded, mail or fax copy of license or test certification.

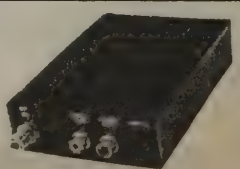
Suggested antenna:
**3318LYARM Loop Yagi Antenna** 14.3 dBd, 6ft boom, horizontal or vertical end mounting....**$99**

**If you dont have our latest Aug 96 10 page catalogue, call, write or email for your copy.**

### 16 dBd High Gain Beam - DSFO ATV-25...$149
In stock, a higher gain replacement for the DXers choice Rutland FO22-ATV yagi. This 25 element version gets more than 16 dBd on a 17 ft boom. 420-440 MHz. Center mount, 8.5 lbs, 100 mph. See 1996 ARRL Handbook page 20.64 for description of this fine K1FO designed antenna. Price is delivered UPS surface.

### VSB Filter 420-450 MHz Band - DCI 435-6..$269
Low insertion loss, 1 dB, and sharpest skirts to better attenuate the lower sideband sound and color subcarriers as well as the other frequency of an inband ATV repeater. Accepts up to 200 watts. Size 21x9.3x3 inches and weighs 10 lbs. Type N connectors.

### Channel 3 to Video and Audio Receiver..... low price, $56
Now you can take the channel 3 output of your 70cm or 33cm ATV downconverter and directly get video and line audio out to drive a monitor using this module. For mobile and portable, you can use your camcorder viewfinder to view instead of a TV set or record the direct video without a tuner. Use a splitter between a TV and this unit into a 1/2 MHz low pass filter before the monitor for digging out weak signal DX. Comes with Wall plug AC 120/16V power supply but can be run on external 13.8 Vdc - internal 12 Vdc regulator, see Fall 96 ATVQ W6ORGy Notes.



5x3.3x1.5".

Oct 96

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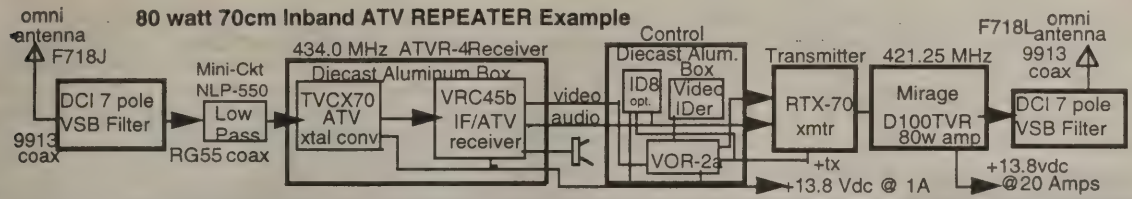
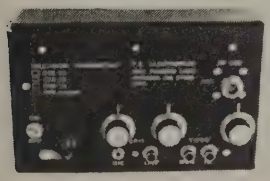
**ELECTRONICS**

# READY FOR AN ATV REPEATER OR LINK IN YOUR AREA?

## WE HAVE THE MODULES AND SOURCES FOR INBAND OR CROSSBAND




Select a RTX Transmitter and an ATVR Receiver for the bands you want, add the appropriate linear amp,VSB filters & antennas, ID & VOR-2a, power supply and coax for your own repeater. We suggest low in / high out for crossband. Ask for a copy of our 8 page ATV Repeater Application Note including recommended sources of filters, antennas, video IDers, etc. before you start so you can do it right the first time. Most can put together a good working ATV repeater for under $2000.



**TRANSMITTERS** ready to go in a 7.3x4.7x2 die cast aluminum box for tight RF shielding. >1 Watt p.e.p. output for proper drive to companion amplifiers. Adjustable sync stretcher to enable set up of the right video to sync ratio after an amplifier is added. Independent mic and line audio inputs. Requires 13.8 Vdc at 500 ma.

**RTX-70** specify output frequency, 421.25 MHz most popular repeater output .....**$279**

**MIRAGE/MFJ D100ATV-R** up to 90 Watts p.e.p on ATV continuous duty, 70cm repeater amplifier, see page 2 for more info and picture .....**$589**

**RTX-33 900 MHz and RTX-23** 1200 MHz 1 watt repeater transmitters are being redesigned and we hope to have them available in the late Fall of 96. ATV compatible linear amps are available from Downeast Microwave - call them at (908) 996-3584.

**RECEIVERS** ready to go in a 7.3x4.7x2 die cast aluminum box for tight RF shielding. Contains a TVCX crystal downconverter and VRC-45b receiver. Two composite video outputs, squelched speaker & line audio outputs. Req. 13.8 Vdc @ 300 ma. We stock crystals for the most popular frequencies, others can be special ordered.

**ATVR-4** specify frequency - 439.25 or 434.0 most popular for inband or crossband repeater input, 426.25 and 427.25 also available .....**$319**

**ATVR-9** specify frequency - 910.25 most popular repeater input.....**$329**

**ATVR-12** specify frequency - 1253.25 link, 1277.25 repeater input.....**$349**

### ACCESSORIES

**DCI 435-6 VSB FILTER.....$269,** specify video carrier freq. 1 dB insertion loss, up to 200 W, steep skirts, 21x9.3x3" 10 lbs.

**VOR-2a Video Operated Relay board...$45,** keys RTX upon detection of horizontal sync plus 10 min. & end of transmission momentary relay for switching to video ID to meet FCC regs. Pots for sensitvivity, hang & ID time. 1.75x3.5".

**ID-8 Automatic Morse Audio Identifier...$89,** Communications Specialists board has 8 programmable and selectable messages up to 200 characters, CW 1-99 WPM, ID time 1-99 minutes, and more features in Non-volatile EEPROM memory. Includes programming key pad. Output up to 4 V p-p. Size 1.85x1.12x.35. Req. 6 to 20 Vdc @ 6 ma.

**DTD-1 DTMF Decoder...$59,** Communications Specialists board decodes up to 4 programable digits for latched or momentary relay driver output. Use for remote repeater on/off, video switching, etc. Size 2.0x1.25". +7 to 16 Vdc.

**LMB CAB 247** 7.3x4.7x2 die cast aluminum box. Great for control housing VOR-2a, DTMF and ID boards...**$22**

### ANTENNAS

When comparing prices remember ours include delivery by UPS surface in the contiguous USA.

**70cm**

**F718** (L,J,A - specify video carrier frequency) Diamond vertical omni 9.3 dBd gain, 15 ft long.....**$238**
Recommended vert. omni for dual antenna inband 70cm or crossband repeater applications. Call Olde Antenna Lab for horiz omni-pg 8

**440-6X** KLM 8.9 dBd gain 420-450 MHz 6 element beam. 28" boom, 60 deg.bw., end mounted (see pg 5)...**$65**

**440-10X** KLM 11.2 dBd gain 420-450 MHz 10 element beam 64 " boom, end mounted.....**$82**

**440-16X** KLM 14.2 dBd gain 420-450 MHz 16 element beam 10.5 ft boom, center mounted .....**$142**

**DSFO ATV-25** Directive Systems16 dBd gain 420-440 MHz 25 element beam 17 ft boom, center mounted.**$149**

**33cm**

**FP-19** Comet vertical omni 10 dBd gain, 7 ft 4 in long. Covers 902-928 Mhz .....**$119**

**3318LYARM** Directive Systems 14.2 dBd gain 902-928 MHz beam. 6 ft boom, end mounted(see pg 4).....**$99**

**23cm**

**F1230** Diamond 1200 MHz band vertical omni 11.3 dBd gain, 10.5 ft long.....**$165**

**2424LYRM** Directive Systems 16.2 dBd gain 1240-1300 MHz beam. 6 ft boom, end mounted(see pg 4)....**$99**

**HAMS, call (818) 447-4565 for your complete 10 page catalog of our ATV products! We have everything you need to get on the 400, 900 and 1200 MHz bands**

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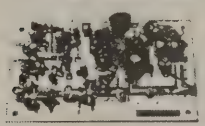
PC ELECTRONICS

# 900 and 1200 MHz BAND ATV GEAR

## Now You Can Go Full Duplex ATV

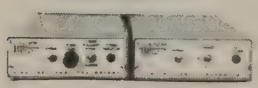
Did you know you can run full duplex or repeat with your 70 CM ATV system by simply adding a 33 or 23 CM system? Receive and transmit at the same time, crossband, without filters; you can get enough isolation usually with 10 ft antenna separation. How about a remote link to your base 70 CM station? Link weather radar or Space Shuttle NASA select satellite video to your local ATV repeater - there is a whole new world of personal & public service applications possible. Sure the 900 MHz band goes half the distance of the 400 MHz band, and 1200 MHz 1/3 given the same power and antenna gain, but you can make up for most of that with smaller but higher gain beams and an antenna mounted preamp.

TX33-1b Transmitter



TXA5-33 900 MHz board 3x5"

23cm FM ATV



IF70 TX1300

### TRANSMITTERS for the 900 and 1200 MHz bands:

**TX33-1b** Ready to go 902-928 MHz band Transmitter. Same features as TX70-1b....**$329**
1 Watt will get you snow free pictures over a line of sight path of 11 miles if 3318LYARM beams are at both ends. 50 miles if a 18 watt Downeast 3318PA amp is added. Contact Downeast directly at (908) 996-3584 for the amp. Specify frequency - we stock 910.25 for simplex and 923.25 for repeater or link. Draws 500ma @ 13.8Vdc.

For those who want to package their own system:

**TXA5-33 ≥1 Watt 902-928 MHz Band wired and tested Transmitter board.....$139**
**FMA5-F** Sound subcarrier board will add audio on with your video (see cat pg 2)..**$39**
**TR-1b** module gives low loss T/R antenna switching between TXA5-33 & TVC-9..**$29**

**HFT TX1300 1 WATT FM ATV TRANSMITTER** 1252, 1255 & 1265 MHz.....**$379**
Will drive Downeast 18 and 35 watt amps. 3 channels programable. Standard 4 MHz video deviation and 5.8 MHz sound (adjustable 4.5-6.5 MHz). SMA RF out. Requires 1 Amp at 12 to 14 Vdc. 6.5x4.2x1.5", 1 lb. RCA jack A/V inputs.

**HFT IF70 70 MHz FM ATV IF/RECEIVER** .....**$249**
Add one of our downconverters and preamp below for complete FM system. RCA video out and 8 ohm speaker jack. F 75 ohm 70MHz input. 12 to 14 Vdc @ 300 ma.

Watch for new 1200 MHz TX23-1b packaged ready to go transmitter coming soon.

### DOWNCONVERTERS for the 900 and 1200 MHz bands:

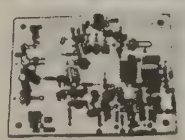
TVC-9G
TVC-12G
Tuneable

**TUNEABLE READY TO GO** in 4x2.5x7 shielded cabinet with 120 Vac to 12Vdc wall plug power supply. All our downconverters have GaAsfet preamp and mixer. If your run of Belden 9913 coax is more than 50 ft, or FM, consider adding the antenna mounted preamp to make up for its loss.

**TVC-9G** tunes whole 902-928 MHz band down to ch 2, 3, 4 or FM 70 MHz.....**$99**
**33LNAWPQ** Downeast antenna mounted preamp, 11dB gain, .8 dB NF.....**$100**
**TVC-12G** tunes whole 1240-1300 MHz band - spec. ch 7,8 or FM 70 MHz.....**$109**
**23LNAWPQ** Downeast antenna mounted preamp, 12 dB gain, ≤1 dB NF.....**$100**

TVCX-9
TVCX-12
Crystal

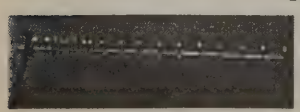
**CRYSTAL CONTROLLED** in die cast aluminum box, requires external 11 to 15 Vdc.
**TVCX-9** specify in 900 MHz freq. & out on CH 3, or AM 45 or FM 70 MHz IF.....**$149**
**TVCX-12** specify input1200 MHz freq. & out on CH 10, or 45 or 70 MHz IF.....**$169**



TVCX-33
TVCX-23
Crystal

**WIRED AND TESTED BOARDS** for those who package their own systems:
**TVC-9** varicap tunes 902-928 MHz to open TV ch 2, 3, or 4, or FM 70 MHz IF .....**$59**
**TVCX-33** crystal controlled specify 900 MHz input and CH 3 or IF output freq.....**$119**
**TVCX-23** crystal controlled specify 1200 MHz input & CH 10 or IF output freq.....**$139**
**VRC-45b** 45.75 MHz IF/ NTSC AM receiver. 2 video outputs, squelched audio..**$109**

### ANTENNAS for the 900 and 1200 MHz bands:



Directive Systems Loop Yagi
(formerly Downeast Microwave)

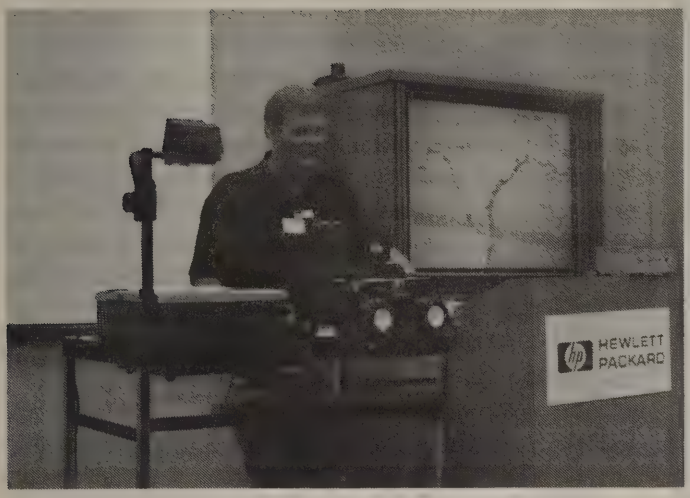
**DIRECTIVE SYSTEMS 3318LYARM 33CM YAGI** 18 element 14.2 dBd.....**$99**
Assembled, specially optimized for 910-923 MHz ATV. 6 ft boom, 50-ohm, N fem.
**DIRECTIVE SYSTEMS 2424LYRM 23CM YAGI** 24 element 16.2 dBd.....**$99**
Assembled, specially optimized for ATV on 1241-1289 MHz. 6 ft boom, 50-ohm N.
**COMET CMW-202N** 5.1 dB portable or mobile 902-928 MHz 18" omni vert.....**$39**
UG-27/CU right angle N connector for portable or fixed operation with TVC-9G....**$5**
**COMET FP-19** 10 dBd base or repeater omni vertical 902-928 MHz 7ft 4" long.....**$119**
DIAMOND **F1230** 11.3 dBd base or repeat omni vert.1240-1300 MHz 10.5 ft.....**$163**

**HAMS, call (818) 447-4565 for your complete 10 page catalog of our ATV products!**
**We have everything you need to get on the 400, 900 and 1200 MHz bands**

# Getting the picture
# DX RECORDS AND ATV CONVENTIONS

**by Henry Ruh KB9FO,**

## ATV Activities, what are you doing?




***Bill Potter N5MBM making opening welcome at the H. A. T. S. ATV symposium in Houston.***

This issues column will focus on current events in ATV. Ham Television is more adaptable than any other mode to activities. If you want to participate in any area of interest in ham radio, you can do it with ham TV and usually have more fun in the process. This includes building equipment and technical symposiums.

Ham TV started on 432 MHz as a part of weak signal operations. With the need for 26 dB more signal than SSB or CW, you need very good equipment to receive those multi-hundred or multi thousand mile images, even more so than the SSB or CW operator who has a significant noise floor advantage. As popularity grew, the video equipped stations moved away from the narrow mode users and settled on 439.25 MHz. This is where you will find most activity today. In some areas 434.00 was adopted as the ATV frequency because of other existing users in the band.

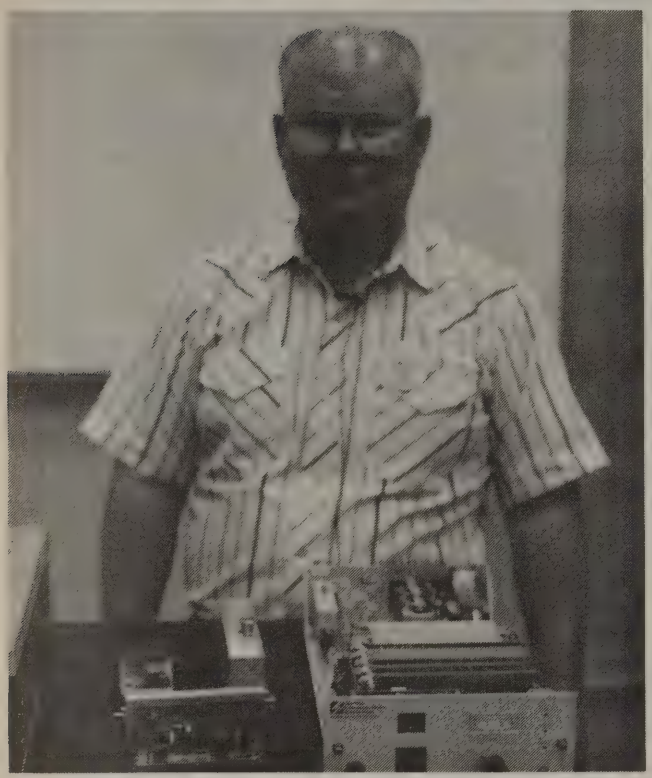
But ATV operators also populate the higher bands of 33, 23, 13, 9 and 3 CM bands. While the video signals are AM modulated on the 70 cm band, most of the video is FM modulated on the higher bands. The reasons are simple enough, there is a lot of DX activity on the 70 cm band, where an AM signal buried in the noise will serve up a delicious set of DX call letters, many dB before an FM video signal is even detected. With the lower occurrence of DX on the higher bands, point to point communication is the dominate mode, and FM video provides snow free/ noise free signals over these shorter distances. But DX does occur! Even on the 3 cm band (10 GHz) where you may think range is limited to what you observe on your radar detector on the expressways, DX of several hundred miles is possible!

On June 8th, two-way ATV contacts, using FM video, were swapped between Art McBride KC6UQH at Gavoita Pass, just north of Santa Barbara, CA, and Ray Clancy N6RE at Torry Pines (near San Diego, CA) for a DX of 204.4 miles. Power output was +28dBm (less than a watt) with modified Qualcomm Omni Tracks and 3 foot dish antennas using right hand circular polarization. The altitude was about 200 feet AMSL for each station.

The Europeans have been transmitting ATV over several tens of miles for several years, most recently between countries along the English Channel, where a boundary layer near the surface of the water ducts the 10.4 GHz signal from coast to coast. Operations were from beach level, and the operators could visually tell when the signal would go away as a ship passed between the stations in sight of the operators.

As Andy Emmerson G8PTH reports, on May 18th, 1996, F1JSR and HB9AFO concluded an ATV DX QSO on the 10.4 GHz frequency between the island of Corsica and the mainland of Spain a distance of 592 Km or about 356 miles! This is a new world record for this band and mode. Meanwhile efforts continue to bridge the 2500 miles from Hawaii to California on this band!

F1JSR was staying one week in Corsica in JN42RQ (grid square) in the Sierra di Pigno at a height of 960 meters (1100 feet) above sea level. His equipment was a DRO (dielectrically resonant oscillator) synthesized transmitter on 10.450 MHz followed by a travelling wave tube ampli-



*Rick Pense WD5BQN, talks about cheap 3.3 GHz links using old satellite equipment, see pg 47.*

fier delivering 20 watts to an Ikea parabolic antenna of 40 cm (a little over 1 foot) diameter. For reception he had an offset feed antenna of 85 cm, a non modified Astra Low Noise Block converter (LNB) a 500 MHz converter and a standard TV satellite receiver in parallel with a receiver to aim the TV-sat antenna.

On the other side of the QSO, HB9AFO after successive trials at various locations beginning in the region of Toulon (France) ended up at the Sierra de Montseny, near Barcelona, Spain in grid square JN11ET, at an altitude of 1650 meters AMSL. He used a DRO transmitter on 10,480 MHz followed by a 1 watt transistorized amplifier driving an Ikea 40 cm parabolic antenna. His receiver consisted of a parabolic antenna 1 meter in diameter, with a precision ax/el gear, an Astra modified LNB with a noise factor of .7dB and a AR3000 modified receiver followed by a narrowband ATV FM demodulator in parallel with a model 12V TV satellite receiver.

The QSO was complete and bi-directional, with signal varying from P0 to P5 (none to perfect) in color. Very quick level variations were observed (QSB) believed to be caused by a combination of rain, wind and fog in Corsica.

Two days earlier the 10 GHz record had just been set by HB9AFO on the Pic de Nore in the county of Tam (France) grid square JN13FJ, a distance of 574 km. In both cases the QSO's were consistent and lasted for two hours near sunset. A VHS tape will be available (European standard scan) later from Swiss ATV, PO Box 301, Ecublens, Switzerland 1024..

## HAVE YOU SEEN THE LATEST?

One of the most active groups in the US is called HATS. Houston Amateur Television Society. Their group sponsored an all day technical symposium at the Hewlett Packard facillites in Houston, TX on July 13th, 1996. Many ATV'ers representing all areas of Texas and beyond were in attendance. For a measly five bucks, you received a full day of technical presentations, nicely done handouts, and a follow up mailing which included the "chalk board" notes and a VHS video of the talks. A co-op pizza lunch and a follow-on dinner at a nearby restaurant for socializing rounded off the day. The program started with talk in at 7 AM, talks began at 8:30, with lots of show and tell items, and ended about 7 PM after dinner.

**Bill Potter N5MBM, President of HATS** started off the day with a well developed chat on ATV Toys and their practical uses. "When does a toy become not a toy? Because we grow old and put away childish things does this mean we must put away our toys also? Certainly not! Amateur Radio operators like so many other hobbyists pride themselves in their collection of paraphernalia to go with their preferred hubby. Most hams I know that have been into it for any significant amount of time can point to a room full of an amazing array of junk, most of which actually works and proclaim, There's the SHACK. As Hams we collect quite a few gizmos and gadgets that take up room in our shacks" said Bill. [Complete story in this issue] Bill continued and explained the Balloon Lunch Team (BLT) model rockets, model airplanes, even submarines equipped with video. Bill explained how recovery of these ham toys is eased by using an audible or strobe beacon, citing that a rocket can roar to 5,000 feet then be lost in the grass never to be found again if it weren't for its beeping or flashing alarms. As he spoke, a 4x4 RC truck, equipped with a video camera/transmitter was being driven around the room giving foot eye views of the event.

# WEATHER SATELLITE SYSTEMS

from

## Spectrum International, Inc.

| | |
|---|---|
| PROsat II Display Sub System: | |
| Decoder Board and Software, Model TS-VGA SAT 4 | $249.00 |
| 137 MHz Receiving Sub System: | |
| Antenna, Model CY-137-2 | $109.00 |
| Low Noise Pre-amplifier, Model TS 137-P.Amp. | 65.00 |
| 137 Scanning Receiver, Model TS 137-Rcvr. | 299.00 |
| Orbit Predicition Programme, Model TS Track II. | 99.00 |
| Low Loss Coaxial Cable 65' with connectors fitted | 65.00 |
| | $637.00 |
| 1691 MHz Receiving Sub-System: | |
| Loop Yagi Antenna, Model 1691 LY"N" | $109.00 |
| Low Noise GaAs FET Pre-Amplifier, Model TS 1691 HEMT | 250.00 |
| 1691 Receiver, Model TS 1691 RCVR | 350.00 |
| Low Loss Coaxial Cable 65' with connectors fitted | 65.00 |
| | $774.00 |

The cost of a complete 137 MHz System is $886.00 ($249 + $637)
The cost of a complete 1691 MHz System is $1023.00 ($249 + $774)
The cost of the two Systems together is $1,660.00.

Demonstration Disc (IBM-PC VGA Compatible) of Signals recorded from wx-sat System are available for $3.
Shipping: FOB Concord, MA.
Prices subject to change without notice.

MasterCard

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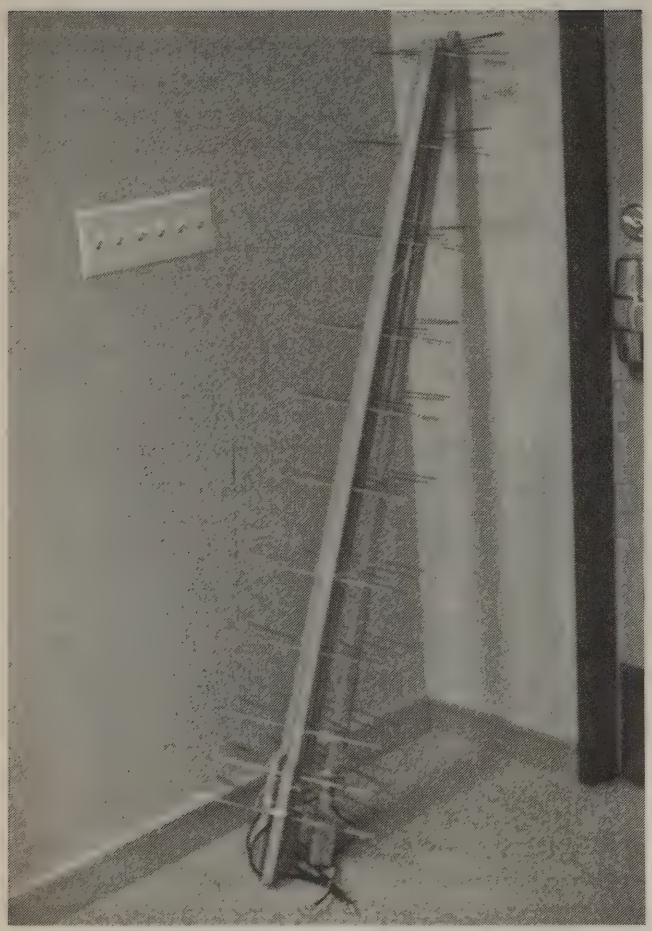
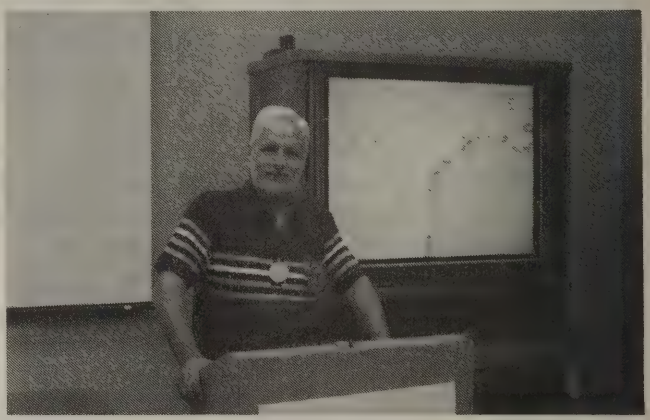
FAX: 508 263 7008

VISA



3.7 to 4.2 GHz) and without much effort, moved the receiver a little lower to cover the ham 3.3 GHz band (Hams have 200 MHz of spectrum from 3.3 to 3.5 MHz, also 275 MHz of space at 5650-5925 MHz and 500 MHz of room from 10 to 10.5 GHz) To give you an idea of size, you could fit every ham band below 500 MHz into any of these bands with room to spare! The HATS group uses the 3.3 GHz band for linking their split site receiver/transmitter ATV repeater together and to also link in other video sources. There is almost no QRM to be found on this band anywhere!

Rick likes the Gardiner series of receivers as they work at an IF of 700 MHz, are phase locked and use lower side oscillator injection. By using the AFC voltage from a 70 MHz IF satellite receiver as the lock signal for the 3 GHz oscillator, provides stable reception which the Gardiner receiver at best never has.



***Ed Manuel N5EM, spoke about how to make very cheap but excellent performance Yagi antennas for ATV.***

The use of CU-Seeme video on the internet, ATV repeaters could connect with other ATV repeaters anywhere in the world for live video. Imagine driving the Houston outer loop and having a video QSO with someone on the M5 north of London!

**Fred Juch N5JXO** showed how easy it was to make a portable ATV repeater using just a crossband combination of TX/RX and the PC Electronics VOR-2A (figure 1). His was built in a box found in his shack junk pile and costs were minimal. For those of you struggling with in-band repeaters, this could be an easy way to expand to crossband operation and encourage operation on bands other than 70 cm.

**Rick Pense WD5BQN,** did a show and tell on using the 9 cm band (3.3 GHz) for linking purposes. Rick rounded up some old satellite TV gear (which receives from

This was followed by an open forum discussion of digital TV with all persons present adding their knowledge to the group as a whole.

For antenna lovers (aren't most hams?) **Ed Manuel N5EM** showed how simple it is to make a home made antenna for ATV, using nothing more than some wire rod and a piece of wood for the boom. The HATS group makes and sells the antennas for $15 in kit form (you push the wires into the holes) in this non critical antenna for 70 cm ATV. Also displayed was a commercial omni-omni "beach ball" antenna on a mag mount. These non directional antennas work fine for short range work, as a "sense" antenna or for balloon or other aerial applications where having a directional antenna is not practical.

**Bob W8ZSX** showed simple filter designs anyone could make to provide band pass or low pass filtering to prevent harmonic interference or overload interference. His designs were simple box forms from brass and circuit board, and included interdigital types using common pipe fittings for low cost and easy of assembly. (Bob promises an article in ATVQ soon).

The last speaker of the day was your scribe, KB9FO, who gave a collection of tips on converting regular ham equipment for video use, modifications to amplifiers and other equipment for better video response.

Readers interested in a full coverage video tape of the HATS ATV symposium should send a reasonable donation (say $10) to cover the cost of tape and shipping, for a VHS copy of the professional tape made at the meeting. The address is HATS, 13054 Pebblebrook, Houston, TX 77079 E-mail to N5JXO@stevens.com

## BUT WAIT THERE'S MORE!

As in the TV commercials, "but that's not all, we will also include this handy gadget, Now what would you pay?" Besides the technical talks, the equipment demos, the presentations, meals and eye-ball QSO, Houston also offered two more important items. The group had a test bench area set-up where you could bring any TV equipment and have it checked for spectral purity (and adjusted while you wait!) or your receiver tuned for lowest noise figure performance, or your filter tuned for proper response (if it could!). But the piece-de-resistance' the la-cream-da-la-cream, is the HATS TV transmitter kit!. Get a hold of your wallets, and peel out a few bucks because you are going to want one of THESE!

A little more than a handful, a professionally documented (CAD even) and designed PCB, loaded with surface mount devices, and an on-frequency PLL (no multiplier stages means no spurs!) multi-watt FM video with FM audio transmitter for the 23 cm band. (see specs sidebar)

This little gem, designed for 1 watt RF output, (most put out 2+ watts and mine runs at 3 watts) with a MMIC final amplifier, and a nice metal case. Very attractive and it WORKS. But the 'kit" part may fool you. Its not like the old Heathkit days: take a 3" yellow wire and solder to point AE (3) and wrap two turns around screw FR and connect the other end to point GR). The kit is mostly assembled. All the hard work has been done under microscope by t he HATS group. Your job is to mount and solder the large MMIC block RF amplifier in place, connect the power wires (12 volts DC) and add connectors of your choice to a metal box, if you don't want to use the on board RCA connectors for audio/video and connect a cable to the SMA RF output connector to your antenna or amplifier. You can add a couple of switches and knobs if you want to accessorize your unit. A dip switch selects the operating frequency from 1240 to 1300 MHz in 1 MHz steps. For a mere $260 (which includes membership in HATS, which gets you a FAXED newsletter!) this little beauty can be yours. Mount it on a small Yagi antenna with a few inches of coax and you are on the air. The first 10 production units were all tested after assembly and all work to or better than spec. HATS is now collecting orders for a run of 50 units. Here is the easiest way you can get on 23 cm FM video/audio, with a CLEAN rig with less effort than eating a container of Hagen-Daz during a DX pile-up.

The unit is small enough and light enough, you could also use in in R/C equipment, although you might want to reduce the drive to the final amp to save battery life! Without the IC RF final, the unit can put out several milliwatts, sufficient for line of sight R/C use. The design has an RF pad in the input feed to the final to control drive power. Changing this pad (resistors) will vary the output power from 1 watt to a maximum of 5 watts.

## So what are *you* doing?

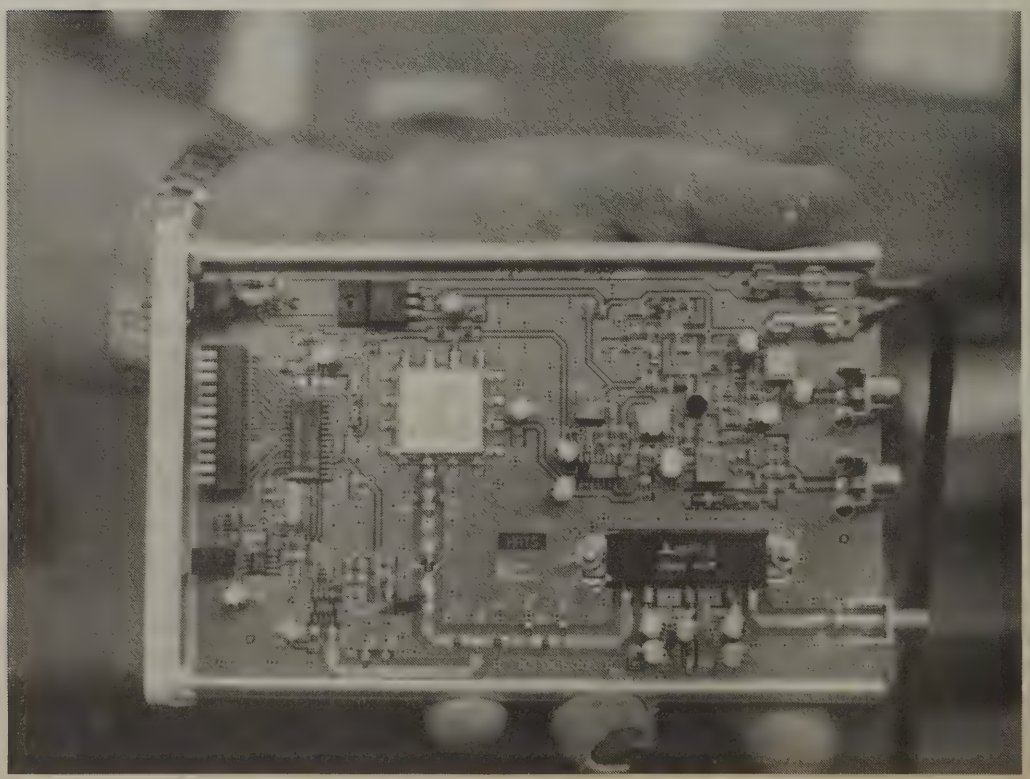
Yes it took some effort to organize and put on this all day event. But your group could do it too. Every area has a variety of ham TV operators who have special knowledge. Some build, some modify, some apply, some theory, but all can be gathered together to SHARE their knowledge. Invite the other hams in your area to attend and show them what you can or are doing with ATV. This could be part of a hamfest or a special event as Houston presented. A meeting room, some soda pop, pizza and a few meeting items can get your going. If you do plan such an event, becure to let the ATV community know with notice well in advance (2 or 3 months is best) so that the magazines can publish your publicity. Its not hard, all you have to do is put the TV remote control down, and pick up your ham mic, and start talking about it.

73 Henry KB9FO Our address: ATVQ, 3 N Court St., Crown Point, IN 46307. e-mail ATVQ@AOL.COM

# HATS ATV KIT TRANSMITTER

| | |
|---|---|
| Power output | 1 watt minimum (2+ typical) |
| Frequency coverage | 1240-1300 MHz in 1 MHz steps |
| Physical size | 4"W x 6"D x 1.25" H |
| Identified connections | Video in, Audio in, Power, RF out, power switch, PLL lock LED |
| Connections: | RF: SMA, Audio/video RCA, power: unterminated wires |
| Power input | 12 V DC (nominal) |
| Audio off-set | 5.5 MHz adjustable |
| Price | $260 |
| Shipping | FOB Houston |
| Warrenty | 14 days |
| Assembly | mount power IC, heatsink and case. All parts included |

Circuit board can be viewed at http://www.stevens.com/HATS



# *ATV SYMPOSIUM*
## *3.4 GHz Link (Xmtr & Rcvr)*
## Rick Pense WD5BQN

I was never a television engineer. I had played with TV all my life, even been to a few TV repair schools, but except for working in a satellite repair shop for a while, I had never earned money generating any kind of video.

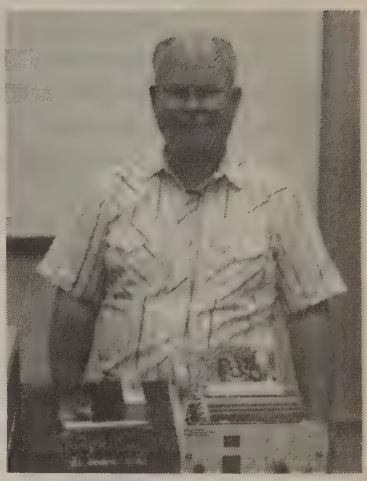
I have been a ham radio operator for about twenty years and am a member of a traditional radio repeater group. I am a trustee of one of their repeaters and do most of the repairs on their repeaters. One day Ed Manual came to our meeting and gave a presentation on amateur TV which interested me enough to come to their ATV meeting. Seemed that there were two repeaters in town on the same frequency and neither worked. A decision was made to combine the two repeaters, but the advantages of 1.2 GHz. FM television could not be realized as the split-site link was on 1.2 GHz AM.

A link on some other band was needed so that 1.2 could be used both as an input and an output for the repeater. Commercial equipment was available for 2.4 GHz, but owing to the availability of equipment for this band and our hope of being able to home-brew transmitters on this band. Another choice was obvious.

I went to see an old friend and employer who had tons of commercial satellite equipment laying around. Dave Paperman, WQ5Y, donated equipment for the link project. I surveyed the stack and found lots of equipment with local oscillators running only 70 MHz away from the TVRO channel, 3.7 to 4.2 GHz. These would not work in our 3.3 to 3.5 GHz band.

Then I found the Gardiner satellite receivers. Seems that their i.f. was at 700 MHz. The icing on the cake was that they used low side injection, and were phase locked. I tore apart the vco module and found a 4 terminal to3 type device which happily generated 10 mw from 3.0 to 3.5 MHz when fed with a voltage varying from 3 to 9 volts.

The design of the Gardiner is such that a low frequency (220 MHz) phase locked oscillator is coupled to the vco modulator and then step recovery diode multiplied to the target frequency of the vco. Old fashioned op-amp circuitry was used as a phase detector. When working well, a Gardiner is not a very stable device. They are very microphonic and will break lock easily. The chances of being able to video modulate the vco and have the internal circuitry keep it stable were slim.



Another problem was that to use the Gardiner as a receiver in the target 3.3 - 3.5 GHz band, the i.f. would have to be moved to 70 MHz. This would make it a challenge to convert the transmitter as the standard satellite channel spacing is 20 MHz.

The answer was to convert the way the Gardiner locked its vco. A 70 MHz LNA type satellite receiver was connected to the junction of the 3 GHz vco and the 3 GHz step recovery diode. The tuning voltage of the 70 MHz satellite receiver, which contained the afc signal was applied to the vco. It turned out to be inverted, so a 2n2222 inverting amp was installed.

The satellite receiver was designed to lock to a signal containing video, so after a pre-emphasis circuit and a 6.2 MHz sound subcarrier are injected, the only thing necessary to tune up the 3.3 GHz transmitter is a voltmeter to make sure you are in the right part of the band, and a TV set to see if the video is inverted when the tuning pot is rotated.

The receiver is much simpler to convert. Open the Front end module and jumper around the 700 MHz i.f. circuitry. Connect the 70 MHz receiver to the mixer. Set the channel on the receiver to the same one as the transmitter. Insert a suitable attenuator between the transmitter and the receiver, I threw the receiver in the car and drove a mile away from the transmitter, and retune the interdigital filters from 3.7-4.2 GHz to 3.3-3.5 GHz. This is a lot easier than it might seem as we don't need near the bandpass they did.

The system has been up for about a year and the only instability has been with the sound subcarrier oscillator. When it gets very cold outside, the oscillator just won't oscillate. A phase locked oscillator is in the works for next winter.

# *ATV SYMPOSIUM*

## *Portable Repeater Cotroller*

## *Fred Juch N5JXO*

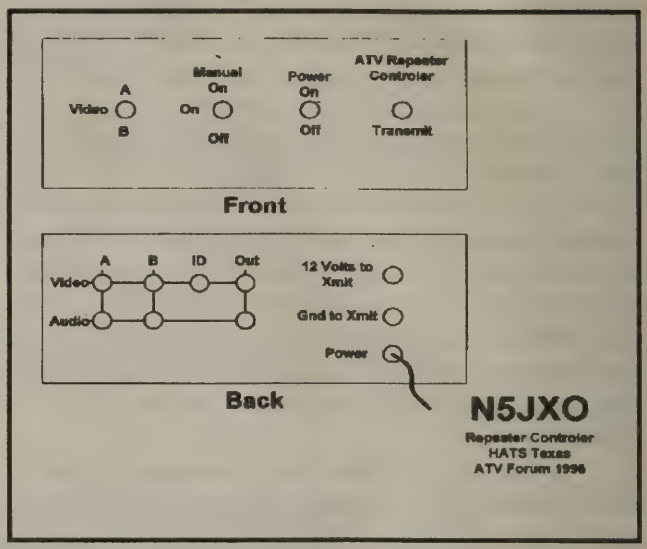
The components listed on the schematics can be obtained from your favorite parts house and the VOR-2A is available from PC Electronics. Assembly is straight forward. Just read the instructions with the VOR-2A and the schematics.

There are several ways you can use the repeater controler. When you put the mode switch in the on position it will key the transmitter 100%. If there is no video source the ID video will be displayed. When video is received it will replace the ID. The 10 minute ID is active.

When in the Auto mode the transmitter is off until video is received, then it will key the transmitter, pass the video and ID as required then unkey.

When in the off mode the transmitter will not key. Operation otherwise will be as in the ON mode.

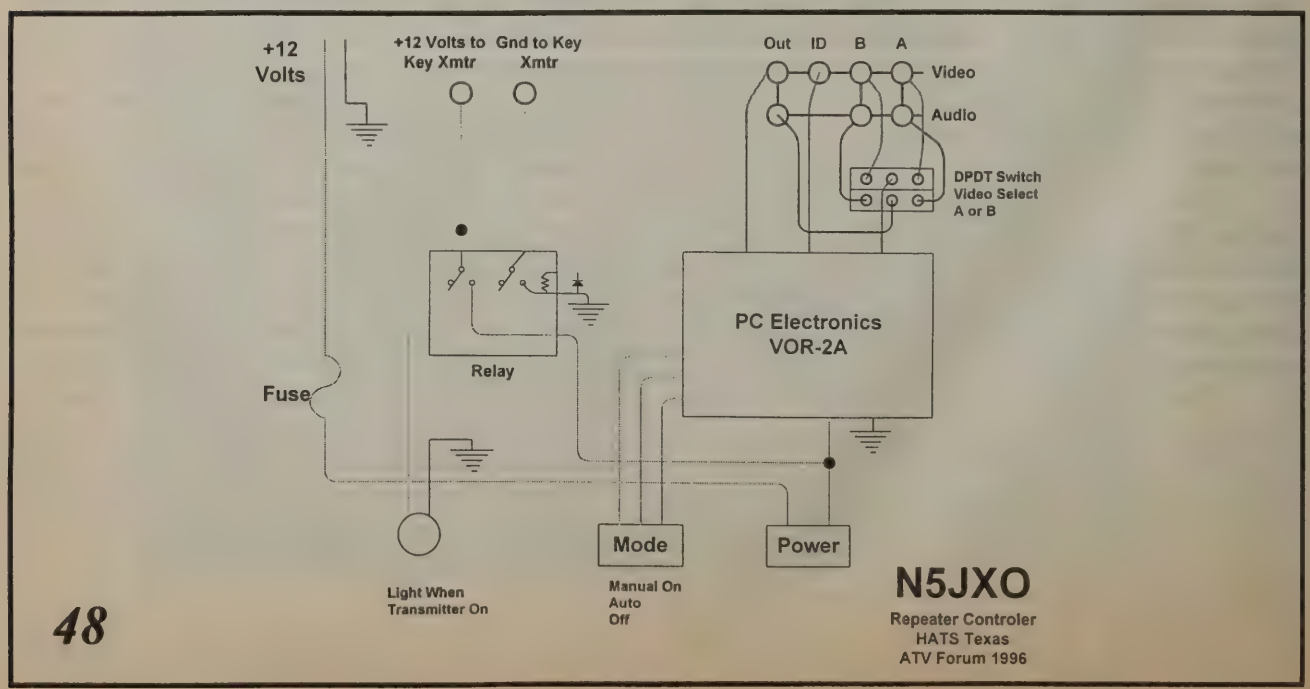
When in the on mode and the receive video connected to the ID port the transmitter will be keyed with no intermittant ID.




With a is buzzer connected to the 12 Volt Key jack it will operate as a video detect alarm

The A/B video switch allows connection of two separate sources.

The relay allows connection to transmitters that need either 12 Volts or Ground to Key.



# *ATV SYMPOSIUM*
# *ATV IN DALLAS*

The Amateur Television Repeater in Dallas, Texas, KCSNQ is an open repeater, open anyone, at any time. The output of the repeater is 421.25 MHz., video carrier, and 4ZS.75 Mhz. aural carrier. This corresponds with cable channel 57, both for video and audio. The repeater can be watched, and heard, by several means:

1. Using a down-converter, 70 cm. antenna, and a common television receiver.
2. Connecting an outside antenna to the cable input to a cable-ready Television or VCR, tune to cable channel 57.

In both cases above, the antenna must be pointed at Downtown Dallas.

The purpose of the KC5NQ ATV Repeater is to provide to the entire amateur community a means to explore this mode of Amateur radio. The repeater is located in downtown Dallas, Texas, on the Bank One building, the second tallest building i n Dallas. Ary licensed Amateur Radio operator may join in by voice with arlyone using the repeater by using the intercom frequencies. There are three intercom channels available: 144.34 Mhz., with a PL of 156.7 Hz; 445.34 MHz., with a PL of 156.7 Hz.; and 1284.34 MHz., with a PL of 156.7 Hz. Ary or a 11 of the intercom channels may be used at a time since they are summed at the repeater and re-transmitted on the aural sub-carrier (425.75 MHz.). Available at the repeater are several video inputs:

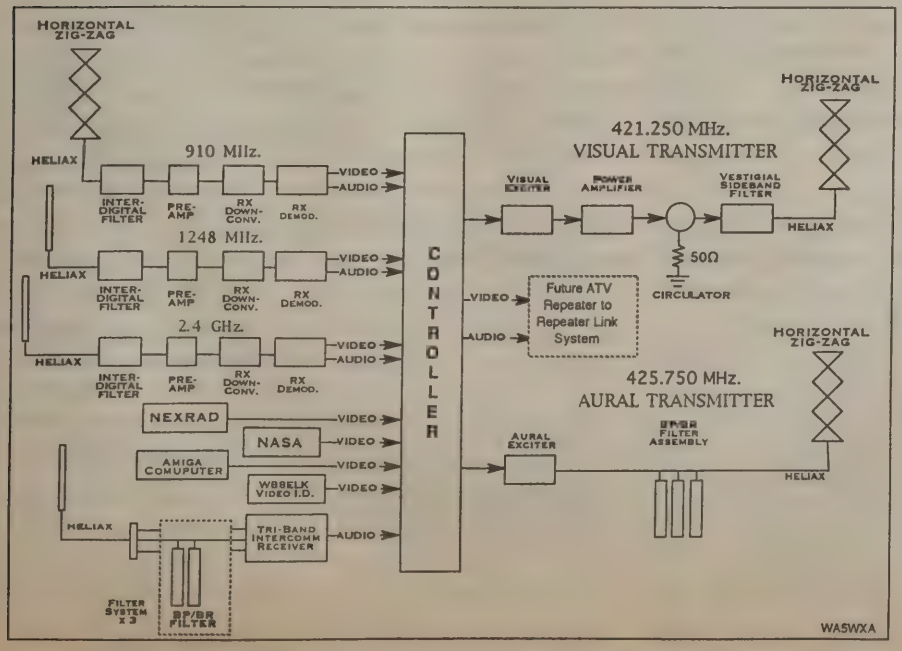
- 910 MHz. F.M. input for general usage.
- 1.248 GHz. F.M. input for general usage.
- NASA Select video, transmitted during Shuttle Missions.
- 2.4 GHz. F.M. input, for specific usage.
- NEXRAD Weather Radar transmitted during inclimate weather i n North Texas.
- To be installed, a camera at the repeater site for viewing the general area.

During non-use periods the repeater uses an Amiga computer to display several video I.D. screens that show various subjects including Marilyn Monroe, Stan and Laurel Hardy, RACES information, and general Amateur Radio Satellite information. These screens are periodically updated with new information on various subjects, all of which pertain to Amateur Radio.

Tuesday evening at 2100 hours (9:00 P.M. Iocal time) there is an ATV Net on the repeater. All the generic Net subjects are covered: check-ins, ATV information, swap-shop, etc. The Net is open to anyone and everyone. The equipment required to access the repeater is minimal:

- An F.M. ATV transmitter, minimum 1 Watt.
- Vdeo source, usually a video camera such as a generic 'cam-corder'.
- Nine element or greater Horizontally polarized antenna for 910 MHz., vertical for 1 . 2 GHz.
- Good coax. Note At 900 MHz. and above, Heliax is the suggested coaxial media.

BLOCK DIAGRAM AND ELEMENT DESCRIPTION
FOR THE KC5NQ ATV REPEATER
LOCATED IN DOWNTOWN DALLAS, TEXAS




KC5NQ - ATV REPEATER

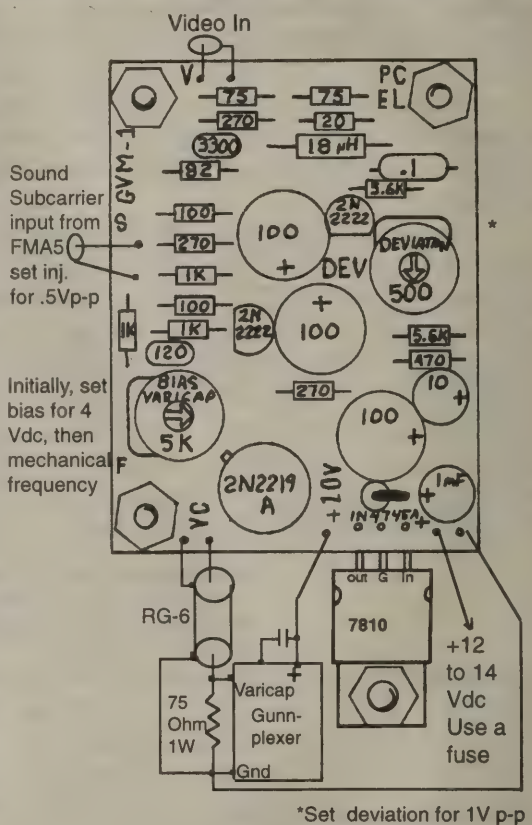
OUTPUT: VISUAL CARRIER 421.25 MHz., AURAL CARRIER: 425.75 MHz.
INTERCOM: 144.34 MHz., 445.34 MHz., 1284.34 MHz., PL 156.7 Hz.

P. C. Electronics 2522 Paxson Lane Arcadia CA 91007-8537 USA ©1996
Tel: **(818) 447-4565** m-th 8am-5:30pm pst (UTC - 8) Tom (W6ORG) & Mary Ann (WB6YSS) O'Hara
24 hr FAX order line (818) 447-0489 Email: tomsmb@aol.com

# GVM-1 Gunnplexer Video Modulator

This board is designed to video modulate 5 to 100 mw Gunnplexers that have a separate varicap input. It will also supply the regulated +10 Vdc basic power up to 1 amp. Mount the board in an aluminum enclosure for both shielding and heat-sinking the regulator. The FMA5 sound subcarrier board can be mounted with the GVM-1 to add sound. The CAB247 makes a nice cabinet for the boards with plenty of panel room for mic and line audio gain pots, jacks, transmit switch, and the deviation and varicap bias pots. The pots on the boards can be removed and wires run to the same value panel type pots. For runs less than 6 inches, twisted wires can be run to the boards but if longer, shielded cable is suggested. Use an F connector for the varicap output (VC). At the Gunnplexer end, remove any other components at the varicap input and connect the 75 ohm 1W terminating resistor to that terminal and ground; run leads to another F chassis connector. Verify the 75 ohms with an ohm meter before applying voltage - any short will blow the 2N2219A. The +10 Vdc can be a 50 ohm coax line with connectors or a #18 red and black wire pair. Use a .1 and a 10 mF or larger cap at the Gunnplexer to filter any + lead noise. If the suggested Gunnplexer power is less than 10V drop the voltage at the Gunnplexer with series 1N4001 diodes (.7V each).

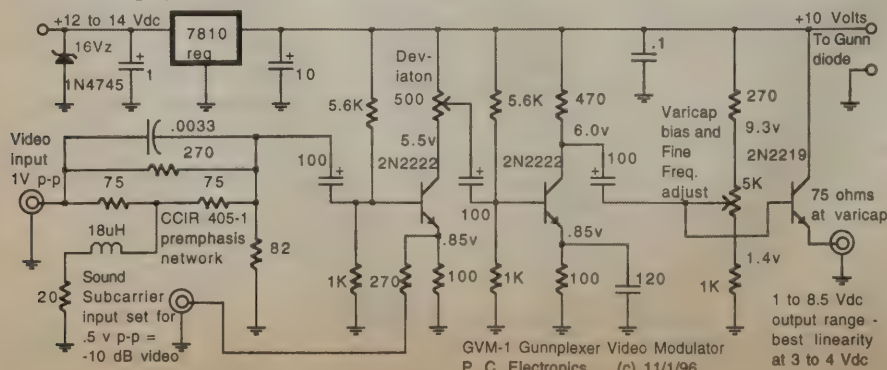
The board is designed for the standard video input of 1 volt peak to peak into 75 ohms and a pre-emphasis network. The 500 ohm deviation pot can be set for either the 4 MHz or 11 MHz standards. Best linearity on most Gunnplexers is with the varicap bias set for 3 to 4 Vdc (5K pot). Set the 4 V bias first and then adjust the Gunnplexer mechanical frequency. The pot can then be used to make fine frequency adjustment (1 to 8.5 Vdc range- 5 to 8 MHz/V) to the point of video limiting. SHF offers a heater kit for frequency stability in temperature varying environments.

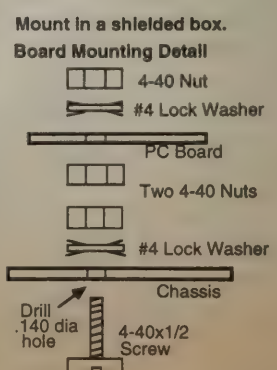



*Set deviation for 1V p-p video out of receiver

10 and 24 GHz Gunnplexer sources:

Advanced Receiver Research, POB 1242, Burlington, CT 06013 tel (860) 485-0310
SHF Microwave, 7102 W. 500 S., La Porte, IN 46350 email: prutz@shfmicro.com
10 GHz Web pages: http://www.tiac.net/users/wade



# *The $70,000 ATV QSO*
# *First DIGITAL ATV*

***Ned Mountain NC4X***

Subj: thanks for the response!

To; All ATV'rs who have written about our digital ATV tests. We will do an article as time permits, but here are some answers to the questions you have asked. Time is extremely limited, so I will not be corresponding on it anymore until we get an article written!!

1.The bandwidth of our first transmission was 2.7 MHz. Modulation type was QPSK and rate 1/2 error correction was used. If we had more power available, we would have used higher data rates and higher bandwidth. These tests are next

2. The equipment is still way too expensive for hams. Each transmit system costs about $70,000, and the receivers are 3,000. This equipment is just now making its way into professional broadcast applications. I think it will be several years before we see prices anywhere near what we need for ham use. But, we are doing this experimental work to show what can be done in the future. We are fortunate to have access to this equipment as it is being manufactured by our company. Anybody working for a television broadcast station or network i very likely to see this type of equipment showing up in the satellite news gathering trucks during the next 12 months.

3. Video quality—It should be as good as what you get over the DSS satellite system, which transmits each channel at data rates similar to what we used. We can set the equipment for any data rate between 2.5 and 15 Mbits/sec. Most broadcasters will use data rates in the 8 mbit/sec range for high quality transmissions. With digital ATV, the picture is either perfect, or gone! In out first transmission, the picture was perfect, and we had about 3 dB of margin. At the 2.5 mbit data rate, pictures are perfect for normal ATV video Higher data rates will insure perfect video under all motion conditions. In addition to transmitting the video, we also transmit 4 channels of 15 KHz audio and a 19.2 kbit/sec data channel.

4. Further experiments are planned in September using higher power and higher data rates, and real antennas between the QTH of WD4MBK in Atlanta, and the two of us from various mountain tops in Georgia and North Carolina. Using digital ATV, we enjoy approximately 15 to 20 dB advantage over conventional VSB-AM transmissions. Thus, we expect to easily communicate over paths that would be impossible using normal analog transmission.

# *Meanwhile...*

**All-Digital Two-Way Television Becomes a Reality**
**FutureVision Brings Interactive Television To Life With World's First Commercial Offering**

The history-making commencement of the world's first commercial offering of all-digital, two-way television. This service is delivered over the first fiber-optic switched digital video system constructed by a telecommunications company, Bell Atlantic.

A real Hollywood gala, press conference, cocktail reception and demonstrations will mark the first time that consumers can switch from traditional cable services to the digital interactive services and entertainment offered by FutureVision. This is not a project, not a test, not a trial, this was real. FutureVision is the first company to provide television programming, PC content and inter-active services over the world's first switched digital video network constructed in Toms River (Dover Township), New Jersey.

The gala will have hundreds of guests including television, film and sports celebrities and programming executives whose programming and new interactive services will be provided over the FutureVision network.

Also available before the event: in-home interviews and photo ops with 200 families from Toms River who have been trying out FutureVision services in their homes since mid-December.

When: Friday, February 2, 5:00 pm to 7:00 pm.

Where:
FutureVision's Customer Service Center, Bayview Corporate Center1433 Hooper Avenue
Toms River, New Jersey

During the evening's press conference, programming executives from some of the networks which will be exclusive to FutureVision, such as the Sundance Film Channel, Speedvision, Outdoor Life, Classic Sports Network and Ovation, the 24-hour performing arts and culture channel (making its world premiere at the event), will discuss what is new, different and exciting about the FutureVision system. FutureVision and Bell Atlantic executives will discuss the historical import of this system and answer questions regarding their plans for network expansion and the roll-out of services.

# *Digital TV ...*

Guests will also see first hand the exciting ways that programmers plan to use the interactive capabilities of the video dial tone network, including TV Food Network's Recipes-on-Request.

The evening will also feature a tour at FutureVision's first ever Customer Service Center which will include the "living room of the future" and customer hospitality center. Tours of FutureVision's $10 million Digital Integration Center in Neptune, New Jersey, where television signals are digitally encoded and interactive content is added, are also available by request.

In addition to providing more channels, sharper pictures, clearer sound...all at a much lower cost than consumers currently have available from the local cable company...FutureVision will also offer interactive services that include: instant previews, on-screen services and two-way TV and PC applications such as FutureVision's TV Mail and FutureVision's NeighborNet, a local e-mail for FutureVision subscribers.

Guests will arrive at FutureVision's Grand Opening Gala to search lights, red carpet and live "cage of doom" motorcycle show sponsored by Speedvision. Inside a live jazz ensemble will play, courtesy of Ovation, and gourmet food and drink provided by TV Food Network will be served. Five thousand orange and purple balloons bring the new FutureVision logo to life and the gorgeous Speedetters, performing models from Speedvision, will be on hand to entertain the group.

B-roll, including FutureVision's music video and interactive demo reel are also available.

Kevin Smith, independent film maker of "Clerks,"
Presented by Sundance Film Channel
Bobby Thomson, New York Giants baseball great
(Hit the "shot heard around the world")
Presented by Classic Sports Network
Bob Schena, Founder co Chairman of FutureVision
Marty Lafferty, President of FutureVision
Steve Greenberg, President of Classic Sports Network
Dr. Harold Morse, President ~ CEO of Ovation
Nora Ryan, President of Sundance Film Channel
Jeff Wayne, President of TV Food Network
Roger Werner, President of Outdoor Life ~ SpeedVision
Len Lauer, President of Bell Atlantic of New Jersey
Bud Aldrich, Mayer of Dover Township
Gretchen Roede or Andra Davidson
of The Tierney Group for FutureVision

# *DIGITAL CLIPS*

***From: forsberg@cts.com (Bruce W. Forsberg)***

Anybody want to share ATV video clips ? Since there is an ATV USENET news group (alt.ham-radio.atv I think this would be a good place to post video clips of ATV operations. I plan on posting maybe a couple a month. Since I have just obtained a video capture card for my PC I can now do this. I will show you some of the sights here is Southern California. I believe this is the best way since for people to download them they will not have to go the internet but just to their internet provider. I plan on posting them as AVI files which should work for windows. Also they will be small but will gave a taste of ATV operations. I have posted several days ago some of the people on the new KC6CCC (10.4 GHz in /3.48 GHz out) ATV repeater and will post soon some of the check ins from the Santiago Peak Repeater (ATN) net.

I will try to answer several of the questions that have been asked about the video clips message that I posted.

>Where can I go see these AVI files, and what board are you using to make them.

Usenet messages are not archived in one spot. They are downloaded to your internet provider every day. It is up to your internet provider as to how long they will be kept. Most providers only keep a couple of days worth so you have to get them when they are posted. I am using the miroVIDEO 20TD. It is a VESA local bus card.

> I don't seem to be able to see this newsgroup. Is it still active?

It is on my internet provider. Not all internet providers carry all the newsgroups. Ask your internet provider to add it to their list. On the other hand maybe my internet provider is not up to date.

> I never knew there was a rec.ham-radio.atv. Thanks, I will look for it. In terms of the AVI files, it's okay. But MPEG is smaller and is easier for Mac and Amiga people to view. It's just the AVI takes up so much room for what it gives, that's mostly my pet peeve with the format. But thanks anyway for the file!

The group is alt.ham-radio.atv. I agree that AVI takes up a lot of room. The software that I got with my video capture board only outputs to AVI format. When I become more familiar with it I will look around for software to perform the conversion and see what is the best method. I hope to post some check ins from Santiago Peak within a couple of days.

Thanks for all the feedback.
Bruce (WB6IZG)

# *DIGITAL CLIPS*

***From: FRED_JUCH@hp-usa***

You may be interested in this message from Australia!

G Day Dave, Bob here VK4SWR just had a look at the homepage you did for your amateur television group, not bad at all. I downloaded your test patterns, I intend to use them at my ATV station, I have a good quality coder card to output video from my pc so they should work well thanks for putting them on the net. I am interested in swapping some video material for ATV, but I have a few problems, one is that I don't have a lot of good stuff to swap (it is a little hard here in Brisbane to obtain) and the other is that I tried to contact Frank N5JXO via email as the home page suggests but to no avail, my isp says that there is no such address, I tried lower and upper case but still no good, can you perhaps organize something? I am only too willing to swap material if I can get in touch with someone who also wants a swap arrangement. Just a little about my station.

I transmit television on the 1250MHz FM television band here in brisbane using a home built 20w transmitter, 1 also transmit on the 444.250Mhz Australian VSB allocation ,here in Brisbane we have a repeater input on this frequency which then has an output on 580Mhz (ch35 UHF TV)~. This is not a bad thing as the general public can tune and watch any time they like, I often do presentations and have my phone number on screen, you would be surprised how many people from the general public phone in and comment on the programs I put to air. I feel that a little material from the U.S.A would not go astray, even home video on American life-styles for instance would be good. Hope you can help. CHEERS FOR NOW BOB MACKIE VK4SWR BRISBANE AUSTRALIA.

# *ATV activity soon in Port St. Lucie, FI.*

Hopefully within a month's time or so, that ATV activity will once again resume in Port St. Lucie, Florida. A team of hams spearheaded by Ladd W2KGV is working on the last preparations prior to installing the repeater atop a local hospital building.

The repeater freqs. will be 434.000 input and 421.250 output. We sincerely hope that we will see a renewed interest in ATV in this region. Good luck to this enterprising team! KF41HX Port St. Lucie

# *UTAH ATV*

***Work continues on the Utah ATV repeater***

More has been done to get the "new" WB7FID 70cm inband ATV repeater on the air. Recent work has been with the IFL (InterFacility Link) system. Since the receive and transmit site are separated by several hundred feed, and since no over-the-air RF is allowed to link from the receive site to the transmit site, a cable must be used Since the site is a poor ground lightning-magnet, balanced line must be used: In this case, 100 ohm twinax. Since the cable is expensive, it is preferred that just one cable be used.

To get all signal back and forth, frequency-domain multiplexing is used. The bandpass is divided into three portions: 1.6-8 MHz for audio/control signals, 12-28 MHz for the low video carrier, and 32-48 MHz for the high video carrier.

The first video IFL modulator/demodulator set has been completed and mostly tested. Based on the NE564, the modulator is frequency locked to a 40 MHz center frequency. The demodulator also uses an NE564. Testing done thus far shows that the video S/N ratio is about 46dB, and the amplitude variation on the multiburst is about 1/2 dB. Overshoot is on the order of 3-5 percent and group delay variation appears to be minimal on the pulse/bar test.

Also part of this system is a filter/combiner/splitter network at each end of the cable. These separate/filter the passbands as well as split/combine the signals to the various units, as well as provide additional transient protection for the equipment.

At each end of the twinax is a specialized balun. This has a Faraday shield to keep common-mode transients out. It also uses resistive matching to convert from the 100 ohm twinax impedance to the 50 ohm system impedance, as well as to absorb transients and increase return loss on the system.

Work is now progressing on the enclosures for the various parts of the system and the aural carrier transmitter is in the latter stages of construction. A separate aural transmit chain is used to eliminate triple-beat.

# W6ORGy NOTES

MINI CIRCUITS

I checked out the Mini-Circuits Lab NLP-550 low pass filter and it will give better than 50 dB attenuation to any 70cm 3rd harmonic, 1200 MHz transmitter or radar that passes through the TX/RX, ICM or Sl VSB filters to desense the 70cm ATV repeater receiver. Price is $39.95 and can be ordered by calling 1 800-214-6428 ext 606 on your credit card. The best place to kill the desense is to put it in the receiver antenna line in series with the VSB filter. You can put a Diamond MX-37 in the transmit antenna line, but that wont help the radar or other near by 1200 MHz transmitters from overloading the receiver.

## ATV repeater desense,

LOW PASS YOUR VSB FILTERS ATV repeater desense, especially a 70cm in band, has been a problem for many. Even with good VSB filters and extensive care in shielding some repeaters still have problems with key up cycling with the ID \video, noisy video, or the receiver AGC being pumped up and seeming to be insensitive because of it. I made a surprising discovery while testing out the new DCI VSB filter. It repeated its 434 MHz passband at the 3rd harmonic with only a few dB of loss. I then checked the International Crystal FL407 and the Spectrum international PSF~IATV and found that theyalso had 3rd harmonic responses with none better than 12 dB down. What this means is that, depending on your final amplifiers 3rd harmonic level, it can overload the front end of your 70cm receiver. Also any co~located 1200-1300 MHz transmitters can overload the receiver or intermod in your final almost as if you had no filter at all. Therefore, if you have tried everything else, try adding a low pass filter between the receiver and VSB filter. I checked out the Mini-Circuits Lab NLP-550 low pass filter and it will give better than 50 dB attenuation to any 70cm 3rd harmonic, 1200 MHz transmitter or radar that passes through the DCI, TX-RX ICM or Sl VSB filters to desense the 70cm ATV repeater receiver. Price is $39.95 and can be ordered on your credit card by calling the Mini-Circuits Lab small order desk at 1800-214-6428 ext. 606. The best place to kill the desense from 3rd harmonic overload is to put it between the receiver and the VSB filter. The NLP-550 is rated only up to a half watt and is 3 inches long and less than one inch in diameter. Insertion loss at 440 is negligible and the cut off frequency is 550 MHz. You can also put a Diamond MX-37N duplexer in the transmit antenna line to kill the generated 3rd harmonic, but that won~ help the radar or other near by 1200 MHz transmitters or harmonics from overloading the receiver. This duplexer is great for crossband portable repeaters where you want to use one dual band 70/23cm antenna. The MX-37N has a high pass filter at the 1200 MHz input and a low pass at the 400 MHz input and will take up to 100 watts. AES shows them in their catalogue for $49.95. Jon, WA2BTW, at TX RX ran a plot on their ATV VSB duplexer for me and it too repeats the 3rd harmonic with a worst case of only 2 dB. So anyone using VSB filters in their system has the potential of overloading the front end of their receivers depending on the 3rd harmonic output of their final amp and the attenuation cur~e of the filters. These 3rd harmonic levels out of amateur linear amps are usually way more than the 70cm front end can reject.

70cm VSB FILTER COMPARISON The new DCI~6 VSB filter measured the steepest attenuation slope compared to the International Crystal Mfg. FL407 and the Spectrum International PSF434-ATV. At the opposite in band repeater frequency located at least 12 MHz away, DCI claims the attenuation will be around 90 dB but is past the limit of my spectrum analyzer to verify. But more important the lower sideband sound is attenuated by more 44 dB. Below is a comparison I made between three of the popular VSB filters I had on hand for 434.0 MHz. The numbers are dB insertion loss.

| | DCI | ICM | Sl |
|---|---|---|---|
| 421.25 tx video | >70 | >70 | 64 |
| 425.75 tx sound | 65 | 64 | 54 |
| 429.50 rx LSB sound | 44 | 37 | 37 |
| 430.4 rx LSB color | 34 | 30 | 31 |
| 434.0 rx video | 1 | 1 | 2 |
| 438.5 rx sound | 2 | 1 | 2 |
| 443.0 rx 2x xound | 60 | 37 | 43 |
| 3rd harmonic | 2 | 6 | 12 |
| delivered price | $269 | *$305 | $202 |

*International Crystal only has 4 filters left; one each on 439.25,427.25, 426.25 and 421.25 MHz. After these they will no longer offer them. The DCI VSB filter can be ordered direct or through P. C. Electronics as well as other dealers and is conservatively rated at 200 watts. I prefer the Sl filter on the receive side since it is much smaller. I had one arc over above 50 watts at the rod ends. A few years ago while checking out the ICM filter with a K2RIW amp, I chickened out at 500 watts because my 9913 was getting quite warm.

# W6ORGy NOTES

70CM POWER AMP UPDATE RF Concepts

Recently some have been experiencing poor color and sound response when using a new RF Concepts (Kantronics) 4-110 100 watt amplifiers. In 1992 I reviewed the then new amp for ATV and found that it only needed a .1 disc ceramic cap with 1/4" long leads paralleled with C23, a 30 pF uncased mica cap, in one of the final base bias lines, to restore the AM frequency response. This cap will keep the bias from frying at a high frequency video rate, but will not let the finals go into low frequency oscillation. It only takes one, don't put one on the other MRF648 final or it will go into low frequency oscillation and blow itself. If your 4-110 seems to lack color response except if the video gain is cranked up too high, this cap may be missing. Take a look inside, and if the .1 disc is not there, put one in. Remember to have at least 1/4" long leads, this little bit of series inductance is very important. Referring to your schematic in the manual, C23 is on the other side of the hair pin wire inductor L8 and not connected to the transistor Q8 base lead. Also connected to the solder pad is ferrite bead RFC L6 and resistor R27 -120 ohm. This addition does not affect any other narrow band modes. I talked to Kantronics about the missing .1 disc cap and they are back in all amps manufactured since September. Mirage - Still no 70cm power amps coming out of MFJ as of mid September. They did finally make a run of the KP2/440 antenna mounted preamps and they are out, but the latest quote was no amps until October.

CH3 TO VIDEO RECEIVER I have gotten some requests for channel 3 in to line audio and video out receivers over the years, from those that want to connect their ATV down converters to it and use the video in of their camcorder or VCR to monitor or record off the air in the field. Others may want to distribute to video monitors rather than TV sets. I bought and checked out the one in the new MCM flyer - RF Demodulator part number 33-2060 - and it worked very well with the TVC-4G or TVCX-4 ahead of it. So I ordered a bunch - you can get it from them or from me for $56 UPS surface shipping included. It comes with a 16 Vac wall plug power supply, but you can tap in at the bridge rectifier output (cathode of D2) and run it off of an external 13.8 Vdc. There is an internal 12 Vdc regulator. The nice metal enclosure is about 5x3.2x1.3 inches. This receiver performs the same function as our VRC-45 module except that it has no speaker output or audio level controls, takes channel 3 input (61.25 MHz) instead of 45.75 MHz IF, or has provision for RF AGC or input gain control. This channel 3 demodulator would allow you to split off to a TV as well as to a monitor or VCR that did not have a tuner. A 1/2 MHz low pass filter in the video line would give you a much more sensitive weak signal DX black and white monitor at the same time with a normal color and sound TV.

K1FO ATV ANTENNA With the demise of both previous owners of Rutland Arrays, the ATV DXer standard FO22-ATV antenna supply dried up. However, Bill Olson got together with Dave Olean of Directive Systems and made an ATV version of the even higher gain 25 element beam. All of the various lengths from 15 to 40 elements of this popular design by K1FO are now in the current ARRL Handbook on page 20.64. The gain is over 16 dBd (18.55 dBi in the Handbook). You can try building one of the 22 element beams using the Handbooks information or buy one of the new DSTO ATV-25 antennas. P. C. Electronics is stocking them for $149 which includes delivery to you in the contiguous USA via UPS surface.

$179 Color Camera

I put a short note on the KD4MOJ ATV Internet remailer about seeing a camera ad in the February Nuts and Volts but did not order one myself - how many does one need WB6YSS would tell me, and you never did package up that board camera you got last year at about the same price.

Some of the guys on the local ATV repeater net got some and they looked quite good on the air; they have been giving me a bad time about the color from my old dying camcorder. The pressure on the net was too great so I weakened and made the call. All I can say is this deal should not be passed up!

The color, resolution and sensitivity is fantastic. These cameras were made to sit on top of a computer for teleconferencing. As such, it sits on a swivel and tilt base and even includes line level output mic audio. Surprisingly this is not a board levelcamera at this low $179 price, but packaged in a plastic case about 5x3x2 inches and ready to go.

# W6ORGy NOTES

The camera comes with a 12 Vdc 300 ma wall plug power supply but you can also run it off any dc power from 10 to 15 volts for portable or mobile. Current draw was 160 ma at 13.8 Vdc but went up to 180 ma at 10.0 Vdc.

I took the new color camera on a weekend running trip to the base of Mt. Whitney with me in the motor home. While driving along, the only problem I had was when I hit a pot hole the camera would bounce off the dash - a little Velcro will fix that. Other wise I got good picture reports through the various Southern California ATV repeaters and links. I did find, however, that the amplified omni mic was too hot, even with the line audio turned almost to zero it picked up too much road noise. The sound worked much better using a Radio Shack 33-986 unidirectional dynamic mic in the mobile.

In the motorhome I run an old TC70-1 transceiver into a D26. To save space and cable runs, the two meter transceiver and the ATV go through a Diamond MX-72N duplexer to a Diamond NR-770H dual band antenna on the roof. With the duplexer I can transmit the 50 watts on ATV and have no desense to the two meter receiver as I listen to the comments from those receiving me. Likewise I can transmit on two meters, as long as the 3rd harmonic is not directly in the ATV passband, without getting overload interference in the picture through: the downconveter thanks to the 50 dB+ rejection of the opposite band through the duplexer.

At the home station, the camera sensitivity and color brilliance is quite good even in a room with just one overhead florescent lamp. The automatic light control does a good job from room to outdoors but there is a iris control to increase the range on either end if need be. The lens is fixed but seemed to hold good focus down to less than one foot. Horizontal field of view is about 72 degrees or 7.5 inches of width for every foot of depth from what I measured.

Sycard said that they had plenty in stock, so if you could use another good color camera - he who dies with the most cameras, etc. - to give another viewing angle of the shack, go mobile or portable, point at an ID card, or just cuz, I can recommend this one.

To get yours call Sycard Technology at 749-1323. They take credit cards or call surface was $5 on top of the $179 for the sales tax. Tom O'Hara, W60RGy tomsmb@aol.com

# *RF SAFETY*
# *by Nizar Mullani K0NM*

To All RF enthusiasts

In response to some of the comments I have received regarding injury to the cornea from UHF radiation, here is some additional information which may be of interest. This information is summarized from a 'med-line' search of the literature from 1960 to this date.

(1) Pulsed radiation in the Magnetic Resonance Imaging devices (64 MHz) can raise the temperature of the cornea by one degree Celsius during a scan. The maximum temperature observed was 35 degrees Celsius in one patient. The temperature at which major changes are believed to occur is 41 degrees Celsius. (It is interesting to note that there is RF induced heating in the cornea even as low as 64 MHz. Therefore, the effects of RF on the body are not limited to UHF and higher frequencies.)

(2) Rats subjected to 1 mW/cmXcm radiation at 434, 915, and 2450 MHz for sixty days showed biochemical changes in the tissue. (Rough calculations indicate that this exposure is equivalent to a one watt transmitter held about 10 cm away from your eyes for sixty days.)

(3) Hamsters exposed to pulsed microwave radiation at 100mW/cmXcm for 10 minutes showed chromosomal changes and detectable opacity in the cornea.

(4) Corneas exposed to pulsed RF at 2450 MHz for 16 to 48 hours at the power level of 10mW/cmXcm showed histologic changes. Similar changes were seen with RF levels of 30mW/cmxcm CW radiation

(5) Corneas heated to 55 degrees Celsius by the use of 2450 MHz RF energy, while being cooled on the outside with cold saline solution showed shrinkage of the cornea.

To summarize these findings, there is evidence of physical and biochemical changes in the body when exposed to RF radiation. Moderate levels of RF at 432 MHz can cause measurable changes and higher levels at higher frequencies can cause irreversible changes. We still don't know the full story about RF caused injuries and their long term effects. So, play it safe.

# *PUBLIC SERVICE*

# History of the Hamtronics XV4-9 Christopher W. Boone

Here is a little thing that we did back in the late 70s and early 80s in the Beaumont-Port Arthur Texas area on ATV...

Hello fellow ATVers ! When KE50, KB5SY, and myself decided that we would try using a VCR output on Channel 3 and mix it up to 439.25 MHz, I contacted Hamtronics and had a nice conversation with one of the techs who told me their 6m to 432 Mhz xverter could probably be redone to handle the 63 Mhz to 439 Mhz. KB5SY (Barnette Singleton) and I ordered the kits and along with Steve's assistance, the kits were assembled and tuned up nicely yet, Steve found the typical output of a VCR was not enough to drive the XVTR input properly.

So back to the think tank..We decided to use some Hamtronics preamps that were made for TV usage if memory serves and use two inline one was not enough gain but two were more than enough..

Using a POT on the first amp, we were able to reduce the gain and get a BEAUTIFUL clean AM signal out of the amp (running about 15 watts PEP as measured on a Bird digital wattmeter) The thing that amazed us was the AUDIO, NO video buzz from the sync as most subcarrier do suffer from. (using a separate TX is best on AM as the big boys do but if you have to run sub carrier, prepare for problems and things you have to do to keep your signal clean!) plus the SAW filter and the tuning on the xverter gave us a fairly good VSB output. (though not a legal VSB under Part 97 or Part 73, it was a start and much cleaner than most simple ATV tx kits, etc on the market) The system was really put to the test in the summer of 1983 during the Bum Phillips Golf Tournament benefiting Bob Hope School for Crippled Children at Hughs Center in Port Arthur. The golf tourney had tons of stars (including the Houston Oilers who Bum was coaching back then and of course Bob Hope) and we had a fun time running the TV shot back to the school so the kids could watch what was being done FOR THEM! (we had also transmitted the CavOILcade parade, a local big event in "Oil City" Port Arthur, earlier in the year for them with use of a bucket truck for a antenna support and camera platform thanks to the now former Gulf States Utilities at which a number of us have worked). We had the then Miss Texas Teen USA acting as a hostess on mic and she would get some of the big names like Jimmy Dean, Bob Hope, Dan Pastomak of the Oilers, and others to talk to the kids via the hand mic attached to the ATV camera and the kids at the school could ask questions back via a 2mtr HT that was in operation by a volunteer at the

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school. One thing I remember as the ATV camera op at the golf tourney was being able to watch the air show just up the road when our transmitter was off.. Steve Gomez, KE50 was at that location with a second setup and the path was a straight line between him, me, and the school so luckily we could watch each other, he got a little less pic from me being on the back side but it was ok the KIDS were the main audience here.

The BIG thing that made the whole thing worth it for all of us was during one transmission from the airshow.Steve was talking to some of the kids at the school during the slow times of the air show One little girl started chatting with him via the 2mtr back link. Steve asked what her name was "Heather" she replied, then she said with a soft voice "Thank you for showing us the air show and the golf tournament."

We both got tears in our eyes when she said that! Later when we discussed it, we did it again In fact, that one thing even to this day still chokes me up. IT was worth it, and THAT was the reason we as amateurs were doing it, not for ego, not for publicity, not for glory, but for those like Heather who couldn't see outside their window most of the time, and got a chance to finally "see" the outside world thanks to amateur radio.

Now enough of my soap boxing. The eyes are watering! After the success of the Hamtronics xverter and preamps, I wrote back to them detailing what we had done. They then came out with the XV4-9 (if I recall the model correctly) which took TV Ch 3 and mixed it to 439.25 (or your choice of freq) and on the back cover of their catalog for the next 5 or so years, was a comment that read "your preamps and the XV4-9 work great on ATV" after that quote was printed the signature; C.B. from Groves, Texas (my home town next to Port Arthur) NOW you know the rest of the story!! 73 Chris Boone WB51TT Good day!

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# WEB TV: WEB SITES OF INTEREST

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|---|---|
| http://psycho.psy.ohio-state.edu/atco | ATCO ATV home page. ** |
| http://www.geocities.com/Hollywood/5842 | East Tennessee ATV home page |
| http:/www.portal.com/ jpawluk/KB6MMF.html | CaliforniaATVhomepage |
| http://www.ladas.com/ATN | Amateur Television Network in Central / Southern California |
| http://www.mindspring.com/~rwf/aatn1.htm | Atlanta, Georgia ATV home page |
| http://www.stevens.com/HATS/home.html | Houston Texas ATV home page |
| http://uugate.aim.utah.edu/ | Utah ATV home page |
| http://www.hayden.edu/Guests/AATV | Phoenix Arizona Amateurs |
| http://citynigbt.com/atv | San Francisco California ATV |
| http://www.njln.net/~magliaco/atv.html | Brookdale ARC in Lincroft New Jersey |
| http://www.smart.net/~brats | Baltimore Radio Amateur Television Society (BRATS) |
| http://www.regio.rhein-ruhr.de/hamradio/atv | German ATV |
| http://www.ecn.net.au/~sbloxham | Australian ATV (exhaustive list of other ATV & ham radio sites) |
| http://www.yahoo.com/Entertainment/television/Amateur_television | listing of the available ATV home pages |
| http://www.yahoo.com | table of contents pointer for a vast variety of topics. |
| http:/www.acs.ncsu.edu/HamRadio | General ham radio info- satelite track, call sign database etc |
| http://www.wolfe.net/~daydream/html/ftpsites.html | Ham radio equipment mod. / problem listing directory. |
| http://www.arrl.org/hamfests.html | Current yearly hamfest directory. |
| http://amsat.org | AMSAT satellite directory/home page. |
| http://www.arrl.org | ARRL home page |
| http://aspl.sbs.obio-state.edu | Local & global weather map information (good detailed info) |
| http://www.ualr.edu/doc/hamualr/callsign.btml | Search by call sign or name. |
| http://psycbo.psy.obio-state.edu/w81t | Ohio State University W8LT radio station. |
| http://www.acs.ohio-state.edu | Ohio State University home page. Lots of neat stuff |
| http://ourworld.compuserve.com/homepages/ipawson | British ATV Club |
| http://www.accessone.com~vbook/hronline.htm | Ham Radio Newsline |

# *WEB TV: WEB SITES OF INTEREST*

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| http://www.ladas.com/ATN http:// | California ATV home page |
| calvin.ksc.nasa.gov:1080/lisats.html | NASA ATV home page |
| http://geopages.com/SiliconValley/1242/wb7fid.html http:/ | Salt Lake City Utah ATV home page |
| /www.prostar.com/~Richard.Keller/ham-tv.html | Washington ATV home page |

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The following addresses are helpful in searching for many different Ham Radio topics on the Internet.
http://www.yahoo.com http:/www.acs.ncsu.edu/HamRadio
http://www.wolfe.net/~daydream/html/ftpsites.html
http://www.ualr.edu/doc/hamualr/callsign.html

Check out these coordinators home pages:

| | |
|---|---|
| T-MARC (The Middle Atlantic FM and Repeater Council, Inc): | http://www.t-marc.org |
| TASMA (Two Meter Area Spectrum Management Association): | http://www.primenet.com/~tasma/ |
| 220SMA (220 MHz Spectrum Management Association of Southern California): | http://www.vcnet.com/kn61a/220smal.htm |
| SCRRBA (Southern California Repeater and Remote Base Association): | http://www.csun.edu/~wsmith/scrrba.htm |
| NARCC (Northern Amateur Relay Council of California Inc.): | http://www.ccnet.com/~rwilkins/policy.html |
| KARC (Kansas Amateur Repeater Council): | http://www.pitton.com/~rcumings/KARC |
| MARC (Michigan Area Repeater Council): | http://www.michvhf.com/marc |
| The NCPA (Northern California Packet Association): | http://arasmith.com/~ncpa |
| CDCC (Carolina Digital Coordination Council): | http://ham,wb4uds.org/cdcc |
| Amateur Electronic Supply | http://www.execpc.cpm/"aesham" |
| Central Ohio Amateur Radio Emergency Service (COARES) Home Page | http://www.iwaynet.net:80/"bbaker/coares/ |
| Central Ohio Traffic Net U | http://home.sprynet.com/sprynet/bblinn/cotn.htm |
| Hocking Valley Amateur Radio Association | http://www.greenapple.com/~kgroves/hvara,html |
| Ham Exam--Practice Exam Generator for Amateur Radio | http://w5ac.tamu.edu/ham-exam.html |
| Ham Radio outlet Paqe | http://www.hamradio .com/ |
| ICOM America, Incorporated | http://www.oz.net/icom/ |
| Kenwood Amateur Equipment Catalog Menu | http://www.kenwood.net/menucat.html |
| The Amateur Radio Information Service Home Page | http://www.infinet.com:80/ trigg/aris.html |
| The Central Ohio Radio Club | httpN//www.infinet.com/jhahn/corc.html |
| The Columbus Amateur Radio Association (CARA) Home Page | http://www.infinet.com/trigg/cara.html" |
| U.S. Amateur Radio Sign Lookup Page | http://www.ualr.edu/doc/hamualr/callsign.htm |
| Universal Radio | http://www.universal-radio.com/ |
| equipment trading | http://www.ring.com/trading/hamradio.htm |
| National Weather Service home page: | http://www.nws.mbay.net/aviation.html |
| GOES satellite images | http://wpx.atms.purdue.edu/maps/satellite/sat_vis_west. gif |
| NEXRAD radar images: | http://www.intellicast.com/weather/sfo/radsum/ |
| KPIX | http://www.kpix.com/live/ |

P. C. Electronics 2522 Paxson Lane Arcadia CA 91007-8537 USA
Tel: **(818) 447-4565** m-th 8am-5:30pm pst (UTC - 8) Tom (W6ORG) & Mary Ann (WB6YSS) O'Hara
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PC ELECTRONICS

# TC70-10 ATV TRANSCEIVER

VALUE PLUS
QUALITY
FROM OVER
30 YEARS IN ATV

**ONLY**
**$499**
**Total price shipped within 24 hrs of your call UPS surface in cont. USA, Visa/MC**

**All in one box**
**420-450 MHz BAND**
**RUGGED**
**RELIABLE**

**≥10 Watts**
**p.e.p. Output**
**-Adjustable**

**Made in USA**

## TC70-10 Transceiver lets you get on ATV right away with all the power most will need in one box - *90 Miles line of sight DX

ATV is no more difficult or different than any voice mode except that you also plug in your camcorder to transmit, and your TV set to receive the picture. That's it - you're seeing as well as talking to other hams live and in color! No other radios needed.

You can show the shack, home video tapes, zoom in and describe projects, show computer graphics and programs, repeat SSTV or even Space Shuttle Video and audio if you have a TVRO. Go portable or mobile, do public service events, RACES, AREC, CAP, even transmit the radio club meetings to those hams that can't make it.

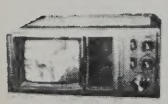
*DX is up to 90 miles snow free line of sight using 14 dBd beams and 100 ft. of Belden 9913 low loss coax.

Transmitting equipment sold only to licensed Tech class or higher Radio Amateurs, verified in the Callbook, and used for legal purposes per 47 CFR part 97. If newly licensed, moved or upgraded, mail or fax a copy of your license or test certification.

- Adjustable peak envelope power RF output
  Typical range from 2 to ≥10W and sync stretcher allows proper adjustment to fully drive the RF Concepts 4-110 or Mirage D1010-ATVN to full 100 Watts p.e.p., without sync or audio clipping.
- Separate mic and line audio volume controls
  Allows voice over commenting when showing video tapes.
- Rugged 7.5x7.5x2.7" black die cast alum. box
  Continuous duty for public service applications. Takes up less space on the operating table than 1 Watt plus amp. 3.5 lbs.
- True Final RF detected video monitor output
  Lets you set the video gain control for actual white level in your video monitor. Camera video is at this phono jack during receive for focus & lighting set up before transmitting.

Front panel phono jacks accept composite video and line audio from your camcorder or VCR. Mini jack for low Z dynamic mic & submini PTL (push to look). Type N antenna jack on rear panel. Sensitive GaAsfet downconverter tunes whole 420-450 MHz 70cm band down to your TV channel 2, 3 or 4. Comes with one crystal you specify on 439.25, 434.0, 427.25 or 426.25 - F1. 2nd switch selectable crystal, F2, add $20. Requires 12-14 Vdc @ 3 Amps. 100% duty cycle.

## COMPLETE 420-450 MHz 70cm BAND ATV STATION



Your TV set

+

**TC70-10....$499**
**ATV Transceiver**
**10 Watts p.e.p. min.**
Downconverter tunes 420-450 MHz
Req. 12-14 Vdc @ 3A power supply
Specify transmit frequency(s):
439.25, 434.0, 427.25 or 426.25 MHz

+

Optional 100 Watt Amplifiers

RF Concepts 4-110.....$359
Mirage D1010-ATVN ...$369
Amps require their own 13.8 Vdc
25 Amp regulated power supply

+

Antennas - see page 5

| | | | |
|---|---|---|---|
| Dir. Sys. | DSFO ATV-25 | 16 dBd | $149 |
| KLM | 440-16X | 14 dBd | $142 |
| KLM | 440-10X | 11 dBd | $82 |
| KLM | 440-6X | 8.9 dBd | $65 |
| AEA | Isopole V omni | 3-4 dBd | $99 |

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Your video camera or camcorder

Remember when comparing prices, ours include UPS surface shipping in contiguous USA. **11/96**

**HAMS, call (818) 447-4565 for your complete 10 page catalog of our ATV products! We have everything you need to get on the 400, 900 and 1200 MHz bands**